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A Glasgow Sensation.

AS reported in our issue of February 10th, a special sub-committee of the Glasgow Corporation Electricity Committee, which was appointed last August to inquire into the working of the Electricity Department, recently submitted its report to the Committee, which, after consideration, adopted it; the minutes of the Committee, containing the report, were considered by the Corporation at a special meeting on Friday last week. A statement prepared by the chief engineer and general manager of the Electricity Department, Mr. R. B. Mitchell, M.I.E.E., in reply to statements in the sub-committee's report, had been circulated amongst the members of the Corporation two days before the meeting, and an abstract of it appears on page 398 of this issue (it should be noted that Mr. Mitchell was not invited to appear before the Committee or the Corporation).

In our previous comment on this subject, we pointed out that the charges contained in the report were mainly directed against the policy and practice of the Electricity Committee itself; Mr. Mitchell, in his statement, deals with the allegations on precisely the same basis, declaring that no expenditure was incurred without the authority of the Electricity Committee, which was kept fully informed on all points, and that the system of management obtaining in the Department had the sanction of long standing. So far as the technical conduct of the Department, and the policy adopted by the Committee on his advice, are concerned, he invites investigation at the hands of experts, who alone can pass judgment upon these questions; at the same time, he maintains that the policy which he recommended was correct, and was justified by the results. The set-back due to trade depression, and the deficit due to the coal dispute in 1926, he points out, could not be foreseen when provision was made for the anticipated growth in the maximum demand by installing additional generating plant in 1923. The change from d.c. to a.c. which has been commenced, Mr. Mitchell states, will effect an enormous saving in capital expenditure,

and he claims that the Department is to-day in a thoroughly sound condition.

Commenting on the statement, the *Glasgow Herald* admits that the gravamen of the charges lies at the door not of Mr. Mitchell personally, but of the Department as a whole, and describes the committee system of control as "an utter failure so far as electricity is concerned." Our contemporary declares that public feeling has been profoundly stirred by the disclosures that have been made, and will demand a searching inquiry into the working of every department of the Corporation.

That was the position when the Corporation, on Friday last, considered the report and the proposal of the Electricity Committee that a sub-committee should be appointed to make recommendations for the reorganisation of the Department. The report was adopted, but an amendment that the Department should be reorganised and the manager should be asked to resign was carried on a show of hands by 43 votes to 42.

Thus, by a majority of one, and without even recording the names of the voters, the Corporation of Glasgow has taken a step of the utmost gravity, involving the condemnation of one of its highest officials (who was not permitted to enter the Council Chamber or to appear before his judges)—one who was chosen for its president by the Incorporated Municipal Electrical Association in 1925, and who has spent his whole career in the service of the City! We have been taught to look upon Glasgow as "the best-governed city in the world"; nothing could have been better calculated to destroy that impression than this display of haste and irresponsibility, which indeed casts a slur upon the whole system of municipal government. Many protests were uttered in the Council Chamber even before the vote was taken, one member urging that it was like trying a man who had already been hanged. The *Glasgow Herald*, not at all prejudiced in favour of Mr. Mitchell, severely criticised the Council's procedure and precipitation, and its failure to realise the responsibility of its own Electricity Committtee for the control of the Department.

We cannot believe that the matter will rest where it is; whatever the merits of the case, it is clear that Mr. Mitchell has been the victim of gross injustice, and has been made the scapegoat for a system for which he was not responsible. The critics of municipal control of trading undertakings could not wish for a better case to barb their arrows. Obviously the full and impartial inquiry that is called for by public opinion in Glasgow must be held, and the manager of the Electricity Department must receive that justice which is the pride of this nation—a fair trial by his peers.

Mr. Mitchell is a member of the Institution of Electrical Engineers, a Past-president of the I.M.E.A., and a member of the Associated Municipal Electrical Engineers. Each of these important bodies must necessarily be keenly interested in a proceeding which vitally affects the professional standing of one of its leading members, and we feel sure that all three will take prompt action with a view to securing for him the just hearing to which he is entitled. When similar questions have arisen in the past, it has been customary to invite a consulting engineer of the first rank to investigate the conduct of the department, and to report thereon to the Electricity Committee; that is the procedure which, in our opinion, should be adopted in this instance, and we hope that every effort will be made to induce the Corporation to stay its hand until that has been done.

The Sale of Fittings.

In our "Correspondence" columns to-day, the "Electric Fittings Statutory Committee" somewhat shyly mentions that it is in existence, and will be pleased to get a job of work; we give it a hearty welcome on the completion of its preparations, and hope that it will be privileged to render valuable service to the electrical industry. Its personnel is admirably constituted for that purpose, efficiently representing all the interests concerned in the working of Section 48 of the Act of 1926, and it may count upon their confidence and esteem.

The Committee regards the fixing of "recognised" retail and trade prices as its most important function; it was, indeed, the primary purpose for which it was provided by the Act. Whether it will often be called upon to determine such questions, remains to be seen, but it does not seem likely that they will present much difficulty. Its other functions are advisory, and the Committee anticipates that the definition of the term "electric fittings" will engage its attention. There is, however, a very comprehensive definition in the Section itself, giving the broadest interpretation to the term, which apparently in this connection covers everything electrical, and is by no means restricted to the applications current in trade circles, so here also the Committee's duties are not likely to be onerous. But let it not be thought that we consider its office a sinecure; on the contrary, an Act of Parliament invariably gives rise to questions which were not foreseen when it was drafted, and we have no doubt that as time goes on the Committee will be more and more frequently called upon to exercise the functions of a mediator or arbitrator, and will have many opportunities for smoothing asperities and maintaining harmonious relations between the various branches of the industry. The absence of such occasions would indicate the existence of a state of perfect peace and friendship without precedent in the areas of municipal undertakings—an ideal towards which the Committee will direct its labours, without hope of its realisation. Those who are in need of advice and assistance may confidently seek the help of the Committee, which now announces that it has "opened shop."

The Progress of Television.

The demonstration of transatlantic television, carried out early last month by the Baird Television Development Co., with the aid of Mr. Hart, an American amateur, made a sensation in the lay Press, and we would not belittle its significance: let due credit be given to Mr. J. L. Baird and his associates for this notable achievement, which bears witness to their spirit of enterprise and their flair for a journalistic "stunt."

At the same time, let us not attach undue importance to the feat. It is freely admitted that whilst the images appearing at Hartsdale, on a screen measuring about 2 in. × 3 in., were seen to be those of human faces, the features were not recognisable, and the images were crude. The feasibility of transatlantic television has been demonstrated, but the art is still in a primitive state, comparable perhaps with that of the telephone before the microphone had been invented, when the instrument had to serve as both transmitter and receiver and communication was both precarious and inefficient. That the future—perhaps the near future—will witness rapid developments we do not doubt, but it must be said that television is still in the experimental stage, and that to talk of "broadcasting television" at present is premature.

At the British Association meeting at Leeds, last autumn, a "Television Society" was formed, of which Lord Haldane has accepted the presidency; the opening meeting of this Society is to take place in London shortly. As in the case of wireless communication, which benefited immensely by enlisting the interest of enthusiastic amateurs, it may well be that the evolution of an efficient system of television will be greatly accelerated by the activities of the Society, and the issue last week of the first number of *Television*, its official organ, suggests that every effort will be made to popularise television in the same way as its elder brother. Already component parts for experimenters' use are advertised, and instructions are given in the new journal for making a selenium cell, and even for constructing "a simple televisor!" All this is very commendable, and we hope that rapid progress will be made towards the development of a system which can be described as fit for commercial use.

Small Hydro-Electric Plant.

Some problems relating to development in this country, and a description of an installation in Aberdeenshire.

By BASIL A. PILKINGTON, F.R.S.E.

THE possibilities of developing many of the numerous small waterfalls in this country, particularly where use can be made of an existing dam, are encouraging and perhaps not generally realised, and in this respect the following notes, which have been taken from a paper read recently by the author before the Royal Scottish Society of Arts, may prove of interest to readers of the ELECTRICAL REVIEW.

In this country, where the rivers are relatively short and few places, if any, are geographically more than one hundred miles from the sea, there are no sites where large waters are available for the generation of electricity at any considerable height above sea level. The most suitable water supplies for small hydro-electric power units, say up to 100 h.p., would be taken, in a district having a considerable rainfall, from a river or stream running moderately swiftly in a wide valley, and with succeeding stages having relatively still water alternating with either small falls or cascades. The surrounding country should have a deep soil well clothed with vegetation, and the subsoil should be porous and capable of taking up a considerable amount of moisture. With such conditions the river is not very liable to floods, and seldom runs very low, even in dry weather; a large amount of water percolates through the soil and passes into the river by rising up in its bed, making a reliable water supply.

The turbine engineer, unlike the old water-wheel man, is able to utilise as large a head of water as he can obtain, and by means of a turbine of only 6-in. wheel diameter, and with a head of 60 feet, he can secure about 19 h.p. Most of our hills are relatively flat near the top, even those having an igneous formation, often containing mossy hollows in which water accumulates and can be stored by means of dams a few feet high.

Having obtained our power station, we may find that it is a long way, possibly a mile or two, from the place where we wish to use the electricity, and the problem of transmitting the energy over this distance is one which demands very careful consideration. In certain precipitous wind-swept regions the use of an overhead line is almost impossible, though it is the cheapest form of transmission, and it may be that an underground cable costing 50 per cent. more would be cheaper in the end. We can, of course, reduce the transmission losses by increasing the supply pressure, but the manufacture of a.c. generating plant for, say, 2,000 or 3,000 volts for small machines has not yet been developed by the makers in this country to any extent, and it is necessary to generate at, say, 200 volts, transforming up to the higher pressure for transmission. The disadvantages of a.c. motors, particularly as regards speed regulation, may have an important bearing on the problem. To convert to d.c. means, perhaps, a loss of 25 per cent. in the rotary, but the transmission losses are reduced to about 10 per cent. of what they would have been if d.c. had been generated and transmitted.

Where hydro-electric systems are applied to domestic use they can be regarded as being almost ideal. The turbine itself is an extremely simple device, being merely a wheel with a number of holes in it through which the water passes, turning the wheel round at the same time. It is frequently suspended on a ball bearing, hanging freely with only a guide at the foot. There are no working parts to get out of order, and it can be run for weeks or even months on end if necessary, without stopping for a moment. In order to get the highest possible efficiency out of the turbine, its diameter, type, and the shape of the vanes, with other factors, are arranged to suit the pressure or head of the water available, and to still further improve the machine and prevent wastage of water. Control equipment is fitted about the turbine to effect this, and this special gear may be regarded as the only part of a modern turbine which requires attention. It consists of a number of guide vanes in the case of a "Francis" turbine, and a needle valve where a "Pelton" wheel is used; the controlling mechanism is usually actuated by an oil-pressure governor after the fashion of the control gear for steering ships. In a new type of turbine* recently devised by Professor Kaplan in Germany, the governor, in addition to actuating the inlet valve or guide plates, is also attached to the turbine vanes which, instead of being fixed, are pivoted so that their angle of inclination to the flowing water can be altered to suit a varying head. This arrangement allows more water to pass through if the head falls, and in this way maintains the speed of the turbine. The relative efficiency of the machine is higher than that of one with fixed vanes. Curious conditions arise where the water pressure is considerable and the suction pipe is unduly long, particularly if the machine is working at a high level. A partial vacuum is caused behind the turbine vanes and abstracts from the water a certain amount of air and, particularly, oxygen which has been dissolved in the water. The oxygen is nascent and causes pitting and eventually collapse of the vanes.

In certain cases where the water available is limited, the switchgear can be so arranged that during the night the energy is used for heating water, and in the morning the current is switched over to the household cooking ranges. Such an installation has recently been carried out by the author in Aberdeenshire, where an old lade and dam, which were used for driving a little water wheel, have been adopted to meet the requirements of an estate. The lade is a mere ditch, fig. 1, about 16 in. wide and 8 in. deep, normally running a mile and a half round the hillside into a small pond. This is on the hillside and the old water wheel is some 20 or 30 feet lower down. Another lade running from

Fig. 1.—The Lade, looking towards Dam.

* ELEC. REV., April 23rd, 1926, p. 681

the dam to the wheel has been disconnected and replaced by an 8-in. pipe. This, however, is carried right down to the bottom of the hill, a distance of about 1,300 feet, representing a drop of 200 feet in vertical measurement; of this drop, 182 feet of effective fall is obtained. The pipe track terminates in the basement of one of the lodges at the entrance gate to the estate, fig. 2,

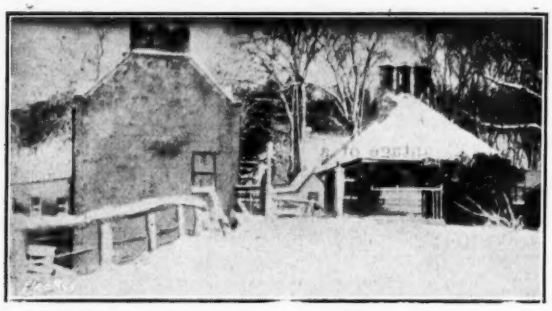


Fig. 2.—The Lodges; Power House on left.

where a small Pelton wheel is fixed and directly coupled to an over-compounded dynamo. Fig. 3 shows the heck in the dam leading to the pipe line; the break in the wall of the dam was made to permit of the necessary spillway being formed. Fig. 4 indicates the shallowness of the dam, which is only 3 ft. deep. In normal use the current is generated at 255 volts, and provides for heating, cooking and lighting. A heavy cable is run up the side of the drive to the house, and is branched to eight other detached buildings, where energy is also available for all purposes. A change-over switch is provided in the house between the main cooker and the hot-water system, so that during the night the current can be used for water heating on

Fig. 3.—Dam, showing Heck and Spillway Break.

the storage principle, and the cooker and hot-water system cannot be "on circuit" simultaneously. Two bathrooms are served by the storage system, and the consumption of the tanks is 6 kW. From the house the supply cable has been carried on a distance of almost half a mile to light two shepherds' cottages, each of which is fitted with a plug to afford a supply for an electric fire, iron, and so on. The voltage at these cottages, about three quarters of a mile away from the generating station, is about 220, and lamps for that pressure are provided there. The whole installation, though small in actual horse-power, provides in the district, which is remote from the ordinary conveniences of town life, all the advantages normally obtainable from the public services in a city, as the water of the dam is also used to supply the domestic needs of the mansion house, farm steading, and the lodges. Some idea of the small amount of water taken by the turbine can be got from fig. 5, which shows the tailrace while

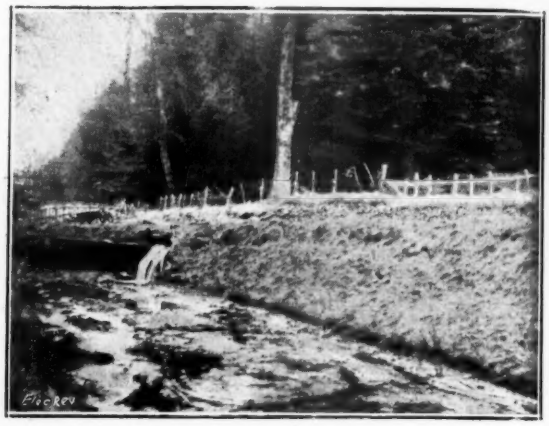


Fig. 4.—The Dam, Empty.

the turbine was running loaded with about 100 lights.

In carrying out small installations of this kind it is necessary to take into consideration various factors in

Fig. 5.—Tailrace while the Turbine is Running.

designing the pipe line. The pipe should have as large a diameter as possible, so as to reduce skin friction between the water and pipe. If subjected to frost,

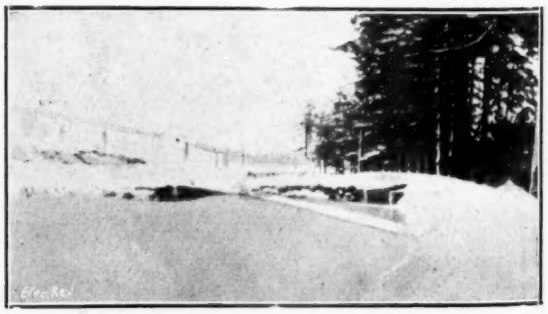


Fig. 6.—The Dam, showing Scum Board and Heck.

it should be buried in the ground with not less than 6 in. of cover, 12 in. if possible. The bends should be few in number and well anchored to prevent the force of the water moving them and opening the pipes.

Flanged pipes are preferable to those having spigot and faucet joints.

A dam should be provided wherever possible; it acts as a settling tank for carried material, and in hill streams is a great advantage, as during floods gravel and even boulders are sometimes carried down; these may choke or even break the straining screen, and thus allow refuse to get into the pipe and choke the turbine.

A dam also permits of a scum board being fixed, as in the case of the Aberdeen installation, fig. 6, which can be used to divert floating material and pass it over an overflow which must, of course, be provided. A turbine has actually been choked with a large mass of eels washed down the flume.

It is remarkable that when the load on a turbine installation of this type is reduced, say, from normal full load to nothing, the rise in voltage is only about five in 230, say 2 per cent., and this variation is rectified in about five seconds. It seems obvious that the immediate development of hydro-electric schemes in this country lies in the installation of small units, seldom exceeding 100 h.p., and suitable for supplying energy for estates and villages. The installation requires very little attention, and that not highly skilled; there is nothing liable to get out of order, and depreciation of the plant is small. The whole cost of a hydro-electric unit often compares favourably with that of an engine, dynamo and accumulator set, but having the further advantage of a 24 hours per day service, and last, but not least, no fuel bill.

Agricultural Electrical Machinery.

A review of the exhibits of the 1928 Paris Agricultural Exhibition, depicting some items of special interest to electrical engineers.

By R. BORLASE MATTHEWS, Wh.Ex., M.I.E.E., A.M.Inst.C.E., F.R.Ae.S.

NOW in its seventh year, the Paris Agricultural Machinery Exhibition is maintaining its reputation for annually increasing its size and importance. A noteworthy addition this year was the inclusion of a number of German firms, thus making it a more truly international show.

It was a very striking fact that on every stand where machinery was exhibited that was at all suitable for power operation, one or more electric motors were employed. It was of further interest to observe the very large proportion of machines which were so constructed as to incorporate an electric motor. This was so noteworthy that the writer made a census and found that eighty per cent. of the machines were so designed. Of course, the great majority, even of these machines, employed a belt drive, in order to obtain the necessary speed reduction. The individual electric drive on the farm is, after all, only following the example of the modern factory. Theoretically, it can easily be proved that the portable electric motor, or the fixed motor with countershaft group drive, from the point of view of interest and depreciation, is more economical than the individual drive. However, those who calculate in this way overlook the greater loss in men's time incurred by

Fig. 1.—Stiemel Dairy Outfit.

the former methods. In these days the man-hours cost is a serious item, and the time required for adjusting and connecting electric motors to their work has to be carefully considered. Now the farmer's interest is the over-all cost, not forgetting the item of convenience. As an example, if a chaff cutter is directly driven, should a shower of rain come on, a farm labourer can be deputed to do some chaffing. He starts his work at once with a "twitch" of the switch, so that no time is lost, and a good amount of chaffing is accomplished before the shower is over. If a portable motor had to be adjusted to the chaffing machine, not only would the assistance of another man have to be called upon, but also the rain might be nearly over before the machine started operations.

A good representation of the modern compact direct electric drive, in which belts are entirely eliminated, is the Stiemel dairy equipment, fig. 1, which was shown. This should be compared with what is still considered to be fairly up-to-date practice, fig. 2. The Stiemel apparatus makes a very compact group for cream separating, butter churning and working, occupying very little floor space; it is very easy to clean. It will be noted that the totally enclosed motor is placed in a vertical position.

A very important improvement in barn machinery is the introduction of ball bearings. Some years ago a Dutch thresher fitted with ball bearings was awarded a silver medal at the show of the Royal Agricultural Society of England, and the result of this was that all British makers brought out ball-bearing threshers. The writer has for some time advocated the employment of ball bearings in barn machinery, but the manufacturers, however, so far, do not appreciate their value.

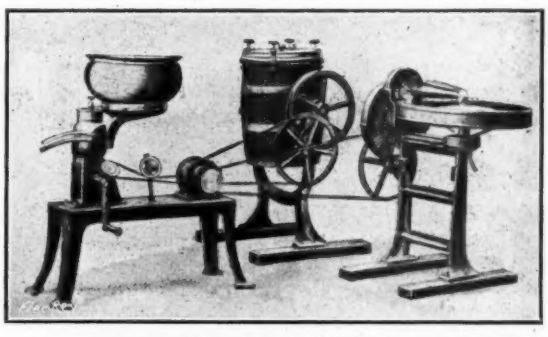


Fig. 2.—Typical Belt Driving for Dairy Plant.

Now that a definite start has been made on the Continent, it is to be hoped that British machines—which are of much better general design—will follow suit. Under farm conditions of exposure, dusty atmospheres, and frequently neglect of lubrication, ball-bearing machines will last longer and take less driving power. The prime mover in this new development at the Paris show was the Société Ardennaise de Machines Agricoles. Ball

bearings were also employed on the vertical shaft of the Sellier crushing mill. This is of a radically new design that appears to be very effective, and it is so arranged as to be easily taken to pieces for cleaning. Amongst the grinding mills it was noticed that the Buco and the Garnier machines were ball-bearing equipped.

On the whole, French manufacturers do not turn out such an effective farm motor as the German and Scandinavian makers. Notable exceptions are the Law, P.E.M. and Roulland firms. The motors of the two former companies have gearing incorporated in their design, and the pinion shafts are extended through the casing for connecting to the machine to be driven. These shafts are arranged to run at 40, 60, 100 and 200 r.p.m. respectively. The gears can also be easily dis-

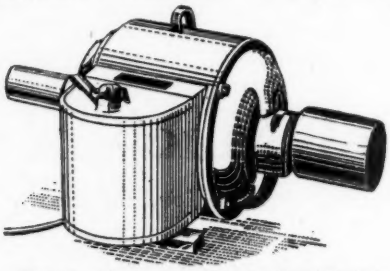


Fig. 3.—Motor and Starter Combination.

connected by means of a plunger when a direct high-speed drive is required. A convenient feature of these motors, from the farmer's point of view, is that the starter casing is formed as a part of the motor frame (see figs. 3 and 4). Fig 3 shows the starter casing on an electric motor without speed-reduction gearing, while fig. 4 illustrates a similar geared motor mounted on a truck for the sake of portability. On this truck will be noted a cable reel, to hold 25 yards of cable, the use of which greatly prolongs the life of the supply lead. A tough-rubber-sheathed type of cable is usually employed, in many instances being protected by a leather external covering. The drive from the gear spindles is usually carried out by means of a double Hooke-jointed shaft. The carriage used for these portable motors is not so effective as some other European designs; for one thing, it is a little high off the ground for stability, and, further, a drive off a wheeled carriage is not very satisfactory.

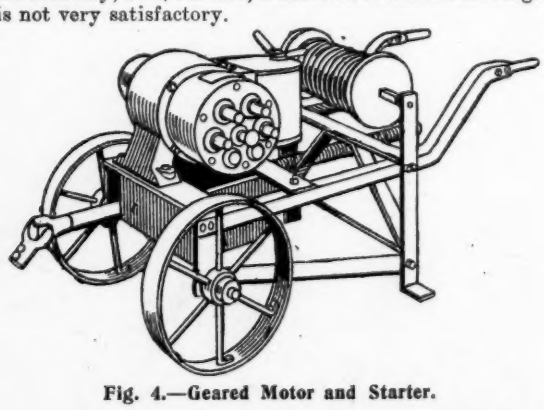


Fig. 4.—Geared Motor and Starter.

For some little time it has been customary on the Continent to run from 25- to 40-h.p. thrashing-machine motors in star when used on light loads, marking the controller "light load" for the star connection and "heavy load" for the delta position.* This principle is now applied to small agricultural motors by Mr. Charles Roulland, *e.g.*, in a 4-h.p. model the starter is also marked for a 1.6-h.p. position. The shaded portion of the diagram, fig. 5, represents the economy in kVA that can be gained by using this first position for light loads. The sizes from 2 to 8 h.p. are also constructed in this way, the light loadings being 0.4 times the heavy ones. While this particular design of motor

* See the author's paper, "Electro-Farming," *Proc.* I.E.E., Vol. 64, No. 356, p. 6.

is of the semi-open type, it is claimed to be dust-resisting. In fact, one was shown working in a glass chamber half filled with bran, which was agitated by paddles mounted on the shaft ends. Ball bearings were, of course, employed. In the case of the slip-ring motors the rings are of differing diameters; this is claimed to make them self-cleaning. The cage of the squirrel-cage motors is ingeniously formed by running-in white metal, the whole rotor being then machined.

One of the most popular electric motors seen for driving the lighter class of farm machinery was the Law portable, fig. 6. This is of the single-phase variable-speed, reversible, geared type, for up to 200 r.p.m.; complete with an adjustable tripod stand, it weighs only 56 lb. The controller is very simple, consisting of a disk mounted on one of the motor end plates. The latter is simply marked ←—Faster-0-Faster—→. The "0" in the centre is the stopping position, and the

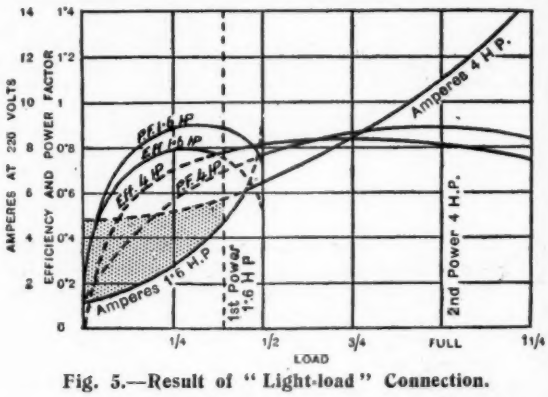


Fig. 5.—Result of "Light-load" Connection.

arrows indicate the direction of rotation. This motor is, of course, chiefly intended for economically replacing man-power. Its consumptions of energy for various classes of farm work are as follows:—150-watt-hr. when cream separating; 300 Wh for butter churns of up to 30 gal. capacity; washing machines, 250 to 350 Wh; water pumping, from a depth of 10 to 12 ft., 400 Wh; winnowing, 180 Wh; seed sorting and cleaning, 220 Wh; slicing a ton of roots per hour, 350 to 400 Wh; crushing 2½ cwt. of oats per hour, 350 to 500 Wh; breaking a ton of cattle cake per hour, 450 Wh; grinding, mowing and harvesting machine cutters, 200 Wh. It is noteworthy that an increasing use is being made of small universal high-speed motors of from 3,000 to 5,000

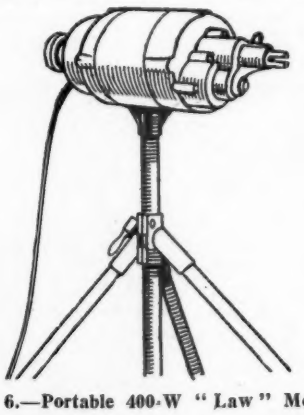


Fig. 6.—Portable 400-W "Law" Motor.

r.p.m., more particularly for water pumps, washing machines, and small circular saws; the basic idea being chiefly, of course, to cut down the first cost of the motors. A weak feature of this class of motor is that a number of makers do not seem to realise the importance of properly placing the armatures in balancing machines. If the balance is not very accurate, in use they soon vibrate to pieces. However, as the sale of this class of motor, particularly for vacuum cleaners, is now very large, experience in manufacture is rapidly increasing.

(To be continued.)

The Financial Budget.

A method of forecasting cash receipts and disbursements suitable for adoption by an electrical manufacturing concern.

By A. W. WILLSMORE.

IT is becoming increasingly plain that in these days of keen competition and heavy overheads, if a business is to be successful those in charge must look ahead and carefully plan the progress of the concern. In a previous article we have dealt with a method of preparing a sales and production budget as a means of controlling costs and setting up a standard against which to measure the progress of the company. We have also indicated that the sales budget can be used as a basis for estimating future cash receipts and disbursements with a view to avoiding financial embarrassment. In the present article we consider a method of financial planning which has been found suitable for application in the electrical manufacturing industry.

Most successful business men estimate their financial requirements for each fiscal year on the basis of the amounts required in previous years, taking into consideration such factors as the amount of business expected in the coming year, general business conditions (present and prospective), any plans under way for the extension of plant, and other developments. This procedure is extremely crude, and much more refined methods are needed if the financial estimate is to be of any real value. In other words, a scientifically prepared estimate should be made of all probable cash receipts and disbursements over the budget period, taking into account and giving due weight to all factors likely to influence the company's operations. Care must be taken, however, not to impose too much reliance on the budget estimate, which should be revised from time to time in order to take account of developments which were not foreseen at the time of preparation of the previous estimate. A plan that has been successfully tried out is to make it a practice to revise the annual budget estimate at the end of each quarter, extending the budget period by three months at each revision so that the estimate always covers a period of twelve months.

Before attempting to forecast cash receipts and disbursements it will be necessary to prepare an estimate of the company's sales and production expense over the budget period as explained in an earlier article. This budget is a co-ordination of the estimated operations of all the departments of the concern, and is based on a scientific consideration of the general trend and cyclical nature of the business, adjusted in the light of probable disturbing elements. Each item of this budget should be considered as to whether there will be any cash outlay or receipt connected with it, when disbursement or payment is expected to occur, and whether the figure has already been provided for in some other section of the forecast.

In a manufacturing business the main source of cash receipts is from the collection of accounts receivable, and the reliability of the forecast depends very largely upon the accuracy with which this estimate is made. At the commencement of the budget period the company will have a certain amount of orders on hand which have not yet been invoiced out. From this figure, and from the totals decided on as the probable value of sales during the year, figures should be established for the amount of goods to be invoiced out each month. The determination of these monthly totals will be assisted if any large contracts on hand or expected to be booked during the period are excluded from the total and considered separately on a basis of contract delivery dates. Where billing figures are available over a fairly long period they will probably be found to bear quite a close relationship to the corresponding sales or orders-received curve, major fluctuations in the one curve following those in the other at a fairly regular interval. If, therefore, the fluctuations of orders received over the immediate past be examined carefully, a fair approximation of future billings should be obtained. When these figures are adjusted to take account of special conditions existing on large contracts and of any known factors liable to affect the results, it should be possible to prepare a reasonably accurate estimate for the business as a whole. The problem is now to estimate when collections may be expected on each month's invoicing.

If there is any large customer it may be advisable to consider him apart from the other customers, and, depending upon the delivery dates and payment terms under which the orders had been taken, estimate monthly billings and cash receipts on the principal orders on hand and accounts receivable outstanding at the beginning of the budget period. Probable future business would be considered from the point of view of shipments and cash receipts—a consideration of past results helping in this respect—and monthly totals would be established for this business apart from the other sales. Other large customers may in a similar way be treated separately, but a considerable portion of the business, made up of individually small orders, will have to be dealt with as a whole.

In considering the aggregate figure for small orders, it will not be practicable to estimate cash receipts on the basis of payment terms, and a different method of treatment must be adopted. An analysis of the collections of past months should show that there is a fairly uniform ratio between billings and collections. This ratio may vary owing to general trade conditions, but, by careful study, percentages may be set up representing the average portion of each month's billing likely to be paid in the same month and in each following month. These percentages applied to the actual billings of relevant months in the immediate past and to the expected billings of each month of the budget period will serve to indicate the amount of cash receipts to be expected for each month. After taking due care to include cash sales under the correct months the various sections of the estimate should be combined to give total monthly cash receipts from accounts receivable.

The due dates of any notes payable will, of course, indicate in which months payment may be expected, unless renewals are anticipated, while cash receipts from interest and dividends on securities and bank loans, &c., receipts from the sale of scrap and materials, income from share issues, &c., although fluctuating considerably from month to month, can be estimated with a fair degree of accuracy.

Having considered all probable sources of cash receipts it is next necessary to estimate what cash disbursements will be necessary over the period under review.

The estimate of disbursements is based on the budget forecast for each of the departments of the business. Disbursements will arise mainly from accounts and notes payable, pay-rolls, selling and administrative expense, payment of taxes and dividends, and redemption of debentures and loans. The company has a much closer control over payments than over receipts and it should be found consequently easier to forecast disbursements than to estimate receipts. The accounts payable at the beginning of the period must be assigned to the specific months of the budget period in which payment will be made. Additional accounts payable will arise

from the purchase of materials, stores, and advertising space which can be estimated from the monthly billing forecast and main budget estimate. These accounts payable, however, represent invoices and it will be necessary to assign these invoices to the specific months in which payment is to be made.

Disbursements in payment of any notes falling due within the period should be allotted to the proper months, and cash payments on account of wages and salaries should be estimated on the basis of the production and sales programme for the period. Rent, rates and taxes will demand disbursements at intervals which can be predicted with comparative ease. Dividend and interest payments have a definite due date, while payments for plant extensions and for purchases of additional premises are more or less under the control of the company. Having taken into consideration all other sources of cash payments it should now be possible to give a fairly accurate forecast of monthly cash disbursements over the budget period.

The estimated figures should be set out in a table

ANTICIPATED CASH RECEIPTS AND DISBURSEMENTS.

Year 1st January, 1928, to 31st December, 1928.

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	TOTAL
Cash receipts.													
From accounts receivable													
,, notes receivable ...													
,, loans													
,, other sources													
Total receipts													
Cash disbursements.													
On wages													
,, salaries and commissions													
,, accounts payable													
,, notes payable													
,, advertising													
,, rents, rates and taxes													
,, dividends													
,, other expenses													
Total disbursements													
Balance receipts or disbursements .													
Cash balance at beginning of period .													
Cash balance at end of period													
Excess of disbursements													

similar to that shown above, and the figures carefully considered from all points of view.

Since a business must pay its way, it is necessary for its operations to be planned so that its cash receipts will be as much as its cash payments. It will be appreciated, however, that it is impossible to obtain an exact estimate of cash receipts and disbursements, and a cash balance is carried primarily to provide for these minor inaccuracies. Care must be taken, therefore, to ensure that a sufficient amount of cash will always be on hand to meet any unforeseen developments. It is mainly to perform these functions that a financial budget is prepared.

When the estimate is adjusted it will serve to show, well in advance, whether surplus funds may be invested profitably or whether temporary financing will at any time be necessary, and if so, for how long. The financial budget can also be employed to serve another useful purpose. When the balance sheet of a concern is submitted at the end of a financial period, it certainly gives a very clear picture of the financial position of the undertaking, but this information is purely historical. If a carefully prepared financial estimate is made out, however, it is possible to present to the management a balance sheet showing what the position will be in a year's time, assuming that present plans are carried out. The advantages resulting from this scheme are too obvious to need stressing and the idea is being widely adopted in the industry, so much so in fact that the manufacturer who neglects to take advantage of this development of scientific management is considerably handicapping the competitive powers of his business.

The Applications of Cadmium.

An Outline of several of the Important Applications of the Metal in the Electrical Industry.

By N. F. BUDGEN, Ph.D., M.Sc.

CADMIUM is a metal very much like tin, only that its colour is much nearer to that of steel. It melts at 320 deg. C., boils at 768 deg C., and is volatile. It is closely allied to zinc, and has several interesting applications in the electrical industry, some of which are outlined below.

Electric Batteries.

Edison* in 1900, designed a primary cell capable of giving a large ampere-hour output at a low, but constant, e.m.f.; the cell consisted of a cadmium-copper oxide combination in an alkaline electrolyte, was really reversible, and not subject to the defects inherent in cells of the zinc-copper oxide combination. Finely divided metallic cadmium, prepared by deposition upon a platinum wire from a solution of cadmium sulphate, constituted the active material for the negative electrode; after washing, this material was packed into pockets stamped in perforated iron plates. The metal oxidises upon discharge, but does not then dissolve in the electrolyte, so that in this respect it behaves more like a lead negative in an acid solution than a zinc negative in an alkaline one. The electrolyte recommended was a 10 per cent. solution of sodium hydrate. This cell quickly fell into disfavour when the iron-nickel

* Wade, E. J., "Secondary Batteries," p. 139.

oxide combination, also invented by Edison, was put upon the market.

Alkaline accumulators are now in use, and recently a new process for making the plates has been described by Forseke and Aschenbach,* according to which cadmium is obtained in a finely divided form of a spongy precipitate from a solution of a cadmium salt. In order to obtain it, zinc powder is added to a solution of cadmium chloride; then the precipitated spongy cadmium, mixed with zinc powder and a small amount of oxide of mercury, is spread upon suitable supports for making the battery plates. Such porous cadmium electrodes are used in a caustic soda, or potash, bath against a nickel electrode. During the first charge the mercury oxide is reduced to the metallic state, and the mercury then envelops the particles of cadmium and zinc. On discharge, the zinc dissolves out, while the cadmium becomes oxidised and the mercury remains unaffected; the zinc thus remains only temporarily in the mass and aids in rendering it porous.† Alkaline accumulators have certain distinct and important advantages over ordinary lead-acid cells, one of which is that they may be completely discharged, or allowed to remain charged, though not in use, or under supervision, for any length of time without harmful results. The cost ruling at the present time is about three times as great as that of lead-acid cells of the same ampere-hour capacity, the cadmium being an important item in the expense of manufacture. If the price of cadmium can be reasonably reduced, there is a promising field for its application in this direction.

Cadmium Lamps.

A report upon three lamps known as (1) the Pearson " Nife " miner's lamp (Jungner cell), (2) the Worsnop lamp, and (3) the Wolf lamp, prepared by Messrs. Riley, Harbord and Law,‡ is interesting in this connection. The batteries used in all these lamps are of the Edison type, having an alkaline electrolyte, a positive nickel plate, and a negative plate composed of finely divided iron and cadmium contained in a thin perforated metal case. The filling of the negative plates of the Pearson " Nife " battery contains 51.6 per cent. of cadmium, the total weight of metallic cadmium in the lamp amounting to 63.2 gm. (about 2.3 oz.). The negative plates in the Worsnop lamp contain 47.7 per cent. of cadmium, the total weight amounting to 70 gm. (about 2.4 oz.). The Wolf battery, which is a smaller one, only carrying two negative plates, as against four in the other batteries, contains 74.5 per cent. of cadmium, the total weight amounting to 42 gm. (1.5 oz.).

One of the new uses for metallic cadmium is in the manufacture of tungsten electric-lamp filaments. An alloy of cadmium (42 per cent.), mercury (53 per cent.), and bismuth (5 per cent.), is impregnated with tungsten powder (about 30 per cent. of the whole) by heating and grinding in a mortar. The mixture is made into wire by the extrusion process as used in lead-pipe manufacture, and is then passed through a die. It is finally heated to drive off the alloy and finished by heating in a vacuum to render the tungsten solid.

Mercury-cadmium alloys have an important application in the manufacture of standard cells, of which they form one of the principal components. A standard cell is one the electromotive force of which is constant and independent of all local conditions; the principal use is for standardisation and testing.

The voltage of a storage cell on discharge represents the difference between two elements, each possessing potential: cadmium happens to be a substance to which (as an electric couple) the positive and negative active material are both electro-negative in sulphuric acid, and cadmium may therefore be employed as a medium for determining the comparative condition of the positive and negative elements during any state of charge or discharge. By immersing a cadmium testing strip in the electrolyte of any cell and connecting it to one terminal of a low-reading voltmeter, the other terminal being connected to either the positive or negative, a difference of potential can be recorded. The ordinary cell-testing voltmeter will only indicate the actual difference of potential of the cell, but with the aid of cadmium and a voltmeter, the potential difference of the cell can be analysed, showing in what proportion the positive and negative elements perform their functions to yield this potential difference, or, more accurately, the relative rate of alteration of the potential difference of each element.

The most important use of the cadmium electrode is in detecting whether it is the positive or the negative element which is at fault in a weak cell. This test is generally made when the cell is discharged to the minimum permissible voltage for the particular rate of discharge, and whilst the discharge current is still flowing. Too much reliance should not be placed on cadmium readings in determining when a cell is charged fully. The value varies so much, according to temperature, age, conditions of plates, and various local conditions, that very misleading results might be obtained. Although the value of the cadmium testing strip has been known for some years, it has not yet come into common use; but as its important value becomes generally appreciated its employment is certain to become standard practice.[1]

Cadmium Oxide Electric Furnace Resistors.[2]

For use as a high-temperature resistor material cadmium oxide is finely ground and mixed with water, with or without the addition of powdered zirconium silicate, and the paste-shaped as desired and heated to 800 deg. C.

The oxide then forms a compact mass of high tensile strength, and is particularly suitable for the manufacture of electric-furnace resistances on account of its low negative temperature coefficient of resistivity, even at 1,000 deg. C. Its low specific resistivity at high temperatures distinguishes it from most other metallic oxides.

Initially it must be heated externally, for example, by the use of a short subsidiary electrical circuit; but when once hot the current will pass through it and the heating effect is obtained. The oxide has the further advantages that it is stable, especially at high temperatures, and that it is more durable and will withstand greater heating than the usual metallic furnace resistors. It can be employed to produce furnace tubes and refractory articles, and other conducting or non-conducting refractories may, if desired, be added before baking.

Cadmium Arc Lamp.

A cadmium-vapour arc lamp which gives an intense monochromatic red light, practically that of pure cadmium, by means of the line λ 6439 A, has been devised and constructed by Bates. It is in the form of an inverted U-tube of 10 c.c. capacity, fitted with two long quartz capillary tubes at its ends, through which the tungsten wire electrodes are admitted and fastened by means of lead seals. The lamp is filled by distilling, from a quartz bulb attached at the bend of the U-tube, a gallium-cadmium alloy containing from 2 to 3 per cent. of gallium. During the distillation the cadmium carries over a minute quantity of gallium, which is sufficient to keep it from breaking the tube on solidification. The presence of the gallium also renders the cadmium soft and prevents its expansion, thus further avoiding breakage. The distillation is carried out at 0.001 mm. pressure, and when sufficient alloy has been distilled into the lamp, the narrow tube by which the bulb is connected is sealed off.

The lamp will burn at 110 V and 3 A with a drop of 14 V across the terminals, but it is more efficient with a current of 7 A and a drop of 25 V; to start the lamp one limb must be heated with a bunsen flame. The lamp

* *Chem. Trade Journ.*, V. 53, p. 491.
† Ger. Pat. 250,385, 1910.
‡ Information given by courtesy of the British Metal Corporation, London.

[1] "Storage Battery Testing," Chloride Electrical Co., Manchester.
[2] U.S. Pat., 1,467,810 (11/9/23).

is durable and requires little attention, and is free from clouding by adhesion of cadmium vapour to the walls.

Cadmium-Copper Wire.

Probably one of the most important future applications of metallic cadmium will lie in its addition to copper for drawing into telegraph, telephone, and power transmission wires. Wire drawn from copper containing a small amount of cadmium possesses all the beneficial properties of the many special brasses and bronzes on the market, and, in addition, its electrical conductivity is not much below that of hard-drawn copper. Such wire has already been adopted on certain electric tramway systems with every success.

The Electricity Meter Reader.

Some comments on his duty to the consumer and to the electricity supply authority.

By EDWARD E. HAMAR.

THE duties of a meter reader are not appreciated to the extent they should be, although there is a decided improvement in the type of man now employed in this capacity.

In the early days it was fairly general for the reading of consumers' meters to be carried out by a man who acted as installation inspector, chief wireman, collector of accounts, &c. It is agreed that this type of man performed the duty efficiently, and any fraudulent connection was soon observed, but as the number of consumers increased it was found necessary to appoint a man for meter reading alone, and, in view of the fact that the duty was considered by many to require very little intelligence, the cheapest man was usually engaged. Such conditions prevailed for some time, and more often than not the reading of the meters favoured the consumer; in some instances unauthorised connections were not detected owing to the lack of knowledge on the part of the meter reader of what the correct wiring should be between service fuses, meter, and main switch.

It is not suggested that there are many instances of the fraudulent use of electricity now, but we do all know that it is quite easy for a person who may feel so disposed; therefore, full reliance has to be placed on the meter reader's observation of any such indiscretions, and in order to attain to that standard he has got to be a man with a certain amount of training.

In the first place, personality must be considered when choosing a man; secondly, it is absolutely essential that he should wear uniform, for consumers are quite justified in refusing any person admission to their premises unless some mark of authority is produced. Uniform is without doubt the ideal evidence of authorisation, and it gains the confidence of consumers, so that they do not feel that it is necessary to watch over the individual from the time he enters their premises until he leaves; gaining the confidence of a consumer is of much help throughout, from the reading of the meter to the payment of the account. Of course, the bogus meter reader, or inspector, is not unknown, although he is not frequently encountered.

Very helpful assistance can be given by the meter reader to the Accounts Department, for meters do have that unfortunate habit of stopping, even the best of them, and much time and trouble will be saved if the estimated consumption can be agreed upon with the consumer, particularly if there is a risk of a dispute after invoicing.

A meter reader should never be allowed to use matches, or any naked light, for noting the registration of meters, which, unfortunately, so often have to be placed in inconvenient dark positions, for it does not matter how careful he may be, there is always a risk of fire. An ordinary pocket flash lamp is quite good for the purpose, but better still are several well designed accumulator hand lamps which are now on the market. In the case of the dry-battery flash lamp, it is found that the renewal of batteries becomes quite an expensive item over twelve months.

Electrical appliances are not as yet without their little troubles, and a word of advice, or a moment spent on a faulty switch, plug, or fuse would often prevent an appliance being condemned without a fair trial. The repairs alluded to are only those which can be conveniently carried out with the aid of an ordinary pocket knife, such as the opening of plug pins, closing switch contacts, replacing fuses, and the like. A little free service on these lines goes a long way towards popularising electric service. Of course, in the event of the defect being beyond the scope of the reader, a brief report should be handed in at the office to which he is attached, for further investigation. Very useful propaganda work can be done by supplying the meter reader from time to time with small leaflets, briefly describing some new electrical appliances, which can be left with the consumer with the usual comments on efficiency, &c.

Training should commence in the meter stores, where he will have the opportunity of becoming conversant with the different makes of meters. Following this a short period should be spent in the meter test room, where he will gain an elementary knowledge of the construction of meters and their correct connections, the latter information being provided by means of small diagrammatical sketches which should be memorised. He should then spend a day or so with a senior meter reader, who would allow him to determine the state of the meters, &c., to see if he is capable of commencing his duty in real earnest.

It is becoming general practice with some electricity supply authorities to arrange for their meter readers to periodically attend at the chief meter testing department, where they are given the opportunity of asking any questions concerning meters, or regarding their duties. This arrangement is no doubt appreciated, and it certainly has a tendency to stimulate that interest in duty which is so essential for efficient working.

When one carefully considers what the careless reading of meters means to both the supply authority and the consumer, apart from the resultant time and trouble needed to settle disputes, one cannot but agree that meter reading is an all-important duty.

The Causes of Motor Breakdowns.

The Royal Automobile Club recently issued its annual analysis of the causes of car breakdowns dealt with under its "Get You Home" scheme during the past year. The analysis, which is on a percentage basis, shows that ignition troubles are still the principal cause of breakdown on the road, forming 21 per cent. of the total. Lighting failures are credited with 2.2 per cent., and engine-starter troubles with 0.9 per cent. The returns show very little change from those recorded in previous years, as the appended table clearly illustrates:—

Causes of breakdown.	1927. %	1926. %	1925. %	1924. %
Ignition failures ...	21.0	22.5	22.7	20.7
Starter failures ...	0.9	0.6	0.4	0.8
Lighting failures ...	2.2	2.1	2.3	2.2

The design and construction of the electrical equipment of motor vehicles has been brought to a high state of perfection, and although the table would seem to indicate that there is still room for improvement, it is more than probable that the majority of the failures have been due to lack of attention on the part of car owners. At the same time, there would seem to be an opportunity for manufacturers still further to improve their productions from the point of view of rendering them more fool-proof and less dependent for regular and continuous operation on the solicitude of those for whom they are provided.

Legal.

Unstamped Insurance Cards.

FOR not stamping the insurance cards of an employé, Robert Taylorson and his four sons, trading as Taylorson Bros., electrical engineers, at Blackburn, were at the Blackburn Police Court, on February 23rd, ordered to pay a fine of £5 in each of two cases. A man named Holden was the only employé, and it was stated that since June, 1923, although the firm had deducted £3 11s. 7d. from his wages, no stamps had been placed on his health or unemployment insurance cards. The total sum owing for stamps was £17 15s. 5d. Alfred Taylorson said that the firm had passed through a trying time, and Holden always received his wages, even when there was hardly anything for the partners.

Rowe v. Col. Eaton and Others.

IN the King's Bench Division, on February 24th, the hearing was concluded before Mr. Justice Rowlatt of an action brought by Mr. William Thomas Rowe, Edmonton, against Colonel Edmund O. Eaton, Sir C. B. Herne-Soame, Bt., the Electricity Finance & Distribution Corporation, Ltd., Colonel Eaton's wife, Mrs. L. B. Eaton, Mr. Wilfrid Burton, a solicitor's clerk, Mr. W. Thompson, a solicitor, Mr. E. C. Buik, and Mr. J. Brigden, to recover damages for having invested £200 in the Wareham Electric Supply Co., Ltd.

Mr. A. J. WILLIS, for the plaintiff, said that in August, 1922, the Wareham Company went into voluntary liquidation, but later the Electricity Finance & Distribution Corporation, Ltd., was registered at the instance of Colonel Eaton, with a nominal capital of £2,000. In June, 1923, Mr. Rowe, having received a copy of a prospectus, sent to the Electricity Finance and Distribution Corporation an application for debentures and ordinary shares of £10 each in the Wareham Electric Supply Co. He paid £195. The prospectus said nothing about the company being in liquidation, and Mr. Rowe was only one of many who saw the prospectus, with the result that £20,000 had been obtained from the public.

No witnesses were called for the defence.

Mr. Justice ROWLATT said that this was a case where silence was fraud. He held that there was no case against Mrs. Eaton, Sir C. B. Herne-Soame, and Messrs. Buik and Brigden, and dismissed them from the action with costs. He, however, entered judgment for Mr. Rowe against Colonel Eaton (who is now undergoing a term of imprisonment, together with Sir C. B. Soame, for fraud for bogus reports in prospectuses of other companies), Mr. Burton, and Mr. Thompson for £195 and costs, and he directed that the debentures issued to Mr. Rowe should be handed over to the solicitor for the defence.

British Thomson-Houston Co., Ltd., v. E. & W. Smith.

IN the Chancery Division, before Mr. Justice Eve, on February 21st, Mr. Trevor Watson moved *ex parte* on behalf of the plaintiffs for an injunction to restrain defendants from infringing their letters patent relating to electric lamps. The motion, counsel said, was supported by three affidavits. The motion was in the ordinary form.

His LORDSHIP: You are taking an *ex parte* order with liberty to serve notice of motion on the defendant?

Mr. WATSON assented, and said the matter was quite in order.

His LORDSHIP: Very well; take your order and leave to serve for Friday.

Commissioners of Inland Revenue v. British Insulated Cables, Ltd.

IN the Court of Appeal, before the Master of the Rolls, Lords Justices Sargant and Lawrence, on February 27th, the Commissioners of Inland Revenue appealed from a judgment of Mr. Justice Rowlatt in the King's Bench Division, dismissing an appeal from a decision of the Commissioners for the Special Purposes of the Income Tax Acts discharging assessments to corporation profits tax made upon the British Insulated Cables, Ltd. In addition to its manufacturing business, the company has a generating plant at Prescot with the primary object of supplying the works. The company has, however, obtained Orders empowering it to supply electricity in certain districts within four miles of its works. The assessments to corporation profits tax were for the accounting periods between January, 1920, and June, 1924, and for the year 1920 the Commissioners found that the total sales of electricity amounted to £50,013, of which £8,166 represented sales to outside consumers, and £41,847 sales to the company's own works. In the year 1920 the total sales (other than those mentioned) were £5,398,471. In the same year the approximate number of persons employed was 7,000, of whom 45 were employed in connection with the electricity undertaking The company's electricity undertaking was not constituted as a separate entity with distinct capital, nor was any distinction made in the annual accounts.

The company contended that it carried on wholly in the United Kingdom an electricity undertaking, and that as it was precluded by statute from charging any higher prices for electrical energy than the prices authorised by Acts of Parliament, the profits of the company were exempted from corporation profits tax by virtue of Section 52 (2) *i* of the Finance Act, 1920.

The Crown contended before the Commissioners that the company was liable to assessment, and, alternatively, if the company was entitled to exemption granted by Section 52, the exemption extended only to the profits derived from the electricity undertaking. The Commissioners decided in favour of the company and discharged the assessments.

Mr. Justice Rowlatt gave judgment dismissing the appeal. He said that those who drafted that particular Section of the Finance Act overlooked the fact that a company could carry on more than one business; the section as worded clearly exempted a company because it carried on, among other businesses, an exempted undertaking.

In the House of Lords, at the conclusion of the arguments, their Lordships affirmed the judgment of Mr. Justice Rowlatt and dismissed the appeal with costs.

Parliamentary News.

(By Our Special Parliamentary Reporter.)

The Severn Barrage Scheme.

On February 21st Colonel WOODCOCK asked the Minister of Transport if he would give the date when the inquiry respecting the Severn barrage scheme was commenced and if the investigations were now completed, and upon what date a report might be expected; if he would state the total expenditure that had already been incurred in connection with the investigation and what was the estimated amount required to complete the inquiry if it had not yet been completed; and what was the result of the Admiralty's report on the scheme.

Colonel ASHLEY said that in accordance with the recommendations of the Committee of Civil Research a small expert committee was appointed in 1926 to undertake certain preliminary investigations with a view to determining whether the technical difficulties of constructing a Severn barrage could be surmounted. Those preliminary investigations were still in progress, and they were not likely to be completed for a considerable time. The expenditure already incurred was about £30,000, and the total cost of the investigations was estimated at £32,300. As part of those investigations a survey of the Severn Estuary had been carried out by the Admiralty, and the information obtained was being considered by the expert committee.

Overhead Telephone Lines.

On February 21st Mr. KELLY asked the Postmaster-General whether, in view of the delay which occurred in telephoning and telegraphing by reason of the number of overhead wires brought down in recent storms, any further extensive scheme of transfer to underground cables was to be entered upon.

Sir W. MITCHELL-THOMSON said that a large number of overhead trunk telephone and telegraph wires had already been placed underground, and further routes were being so transferred. Where practicable a service by means of alternative underground wires was maintained when overhead routes were put out of service by storms. The isolation of commercial centres by breakdown of overhead lines was now rare and of brief duration.

Farmers' Telephones.

On February 21st Captain STREATFEILD asked the Postmaster-General whether he would consider reducing the telephone rentals charged to farmers from business rates to residential rates.

Sir W. MITCHELL-THOMSON regretted that he was not in a position to give farmers exclusive telephone lines at lower rates than subscribers engaged in other businesses. A telephone service for farmers and residents in rural districts was available at specially low rates by means of rural party lines.

Electrical Treatment of Disease.

On February 22nd Lieut.-Commander KENWORTHY asked the Minister of Health whether his attention had been called to the cases of treatment of disease, using electrical methods as well as X-rays and ultra-violet rays, by unqualified practitioners; if he was aware of the danger of such treatment being given by persons without medical training; and if it was proposed to take steps enabling stricter control to be exercised in the interests of the general health of the community.

Mr. CHAMBERLAIN said he was advised that the information at present available was not such as to justify the consideration of further legislation in that connection.

Private Bills.

The following private Bills have been read a second time in the House of Lords:—The Cleveland and Durham County Electric Power Bill, the Lincolnshire Electricity Bill, the North Metropolitan Electric Power Supply (Consolidation) Bill, the Nottinghamshire and Derbyshire Tramways (Trolley Vehicles, &c.) Bill, the Wessex Electricity Bill, the York Town and Blackwater Gas and Electricity Bill, and the Stretford and District Electricity Board Bill.

Reviews.

Collected Physical Papers. By Sir J. CHUNDER BOSE, D.Sc., F.R.S., C.S.I., C.I.E. Pp. xiv+404; 123 figs. London: Longmans, Green & Co., Ltd. Price 10s. net.

The author of these papers, founder and director of the Bose Research Institute, Calcutta, has from time to time startled the scientific world with his remarkable researches in connection with the physiological mechanism of plant and animal life—and of non-living matter as well. In a brief "foreword" Sir J. J. Thomson writes appreciatively of the purely physical achievements of Sir Jagadis, by the employment of refined methods of generating electrical waves of very short wave length, at a time when this subject had not long been thrown open by Hertz's classical discoveries, and pays a tribute to the author for the part he played in reviving interest in physical researches in India. Twenty-eight papers are here reproduced, most of which were read before scientific societies or otherwise published—ten of them appeared in the Proceedings of the Royal Society. They cover a wide field of phenomena in connection with optical and electromagnetic radiation, the effects of electrical and mechanical stimuli on living and inorganic substances, the fatigue and recovery of plants and their susceptibility to anæsthetics and poisons, the assimilation of carbon by plants, &c.

Numerous ingenious instruments are described, and it is evident that no experimental difficulty is allowed to damp the enthusiasm of the author, who is clearly expert in devising ways and means to carry out the most abstruse investigations. The book is well produced, and in many ways is unique.

Physics in Industry. Vol. V. Pp. 54; 10 figs. London: Oxford University Press (Humphrey Milford). Price 2s. 6d. net.

This volume contains two lectures delivered before the Institute of Physics, respectively by Mr. H. E. Wimperis, O.B.E., on "The Relationship of Physics to Aeronautical Science," and Dr. F. E. Smith, C.B., C.B.E., F.R.S., on "Physics in Navigation." The former deals with recent researches which do not concern us; the latter includes sections on the magnetic compass, the gyroscopic compass, echo sounding machines, directional wireless, and the leader cable, and strikingly illustrates the important role played by electricity and magnetism in the art of navigation, some aspects of which have been revolutionised by the application of these twin sciences. The lectures, without going deeply into the subjects named, graphically demonstrate the practical importance of physics in industry and the enormous value of experimental research to modern civilisation. The book is exceptionally well-printed.

Hydraulics. By E. H. LEWITT, B.Sc. Pp. xii+372; 163 figs. London: Sir Isaac Pitman & Sons, Ltd. Price 10s. 6d. net.

This is the third edition of a work which first appeared in 1923, and was intended for engineering students, especially those of the University of London; its popularity testifies to its merits, and it has now been completely revised and extended. The treatment is mainly theoretical, problems of design being beyond the scope of the book, but numerous examples are given of the application of theory to practice, with illustrations and the results of tests on machines. The mathematics, indispensable to such a treatise, has been kept as elementary as possible.

After covering the general basic principles of hydrostatics and hydrodynamics, combined under the term hydraulics, the author deals with methods of measurement of flow, friction and flow in pipes and channels, the characteristics of reciprocating and centrifugal pumps, the theory of turbines, and various types of machines and accessories. Numerous examples are worked out, and questions from examination papers, with answers where these are numerical, are appended to each chapter. The diagrams are clearly drawn, and the paper and printing leave nothing to be desired.

Edison: The Man and His Work. By G. S. BRYAN. Pp. viii+304. London: A. A. Knopf. Price 7s. 6d.

The author has well succeeded in presenting in non-technical language an interesting and very readable narrative of Edison's life and work, brought up to date within the small compass of some 300 pages. The wonderful genius, untiring industry and amazing versatility of Edison are strikingly brought out in the review of the innumerable experiments in which he was engaged, and of the inventions which he carried to a successful commercial issue, from his early childhood onwards. The author records that from June 1st, 1869, when a patent was granted to Edison for his automatic vote recorder, to about the middle of 1910, he applied for 1,328 distinct patents, which works out, roughly, to an average of one patent for every eleven days during this entire period.

Of special interest are the concluding chapters where Edison's miscellaneous achievements—other than the epoch-making inventions with which the world is familiar—are discussed. Among these mention is made of some thirty-nine inventions and plans relating to warfare which were communicated to the Washington authorities by Edison as a result of Secretary Daniels' activity, and officially acknowledged.

One of the secrets of Edison's success is revealed in what he once said about himself. He said that he differed from the usual inventor in having a "bump of practicality, a sense of the business value of an invention." This, he explains, was not natural, but was "pounded into me by some pretty hard knocks." Inventors generally would do well to profit by Edison's experience.

The last chapter is entitled "What manner of man?" and gives evidence of the painstaking research the author has undertaken in order to compile reliable information respecting the character of Edison as a man. The references given show that, apart from consultation of available literature, the author has had the advantage of quite special personal sources intimately acquainted with Edison's personality and home life.

The Shielded Four-Electrode Valve. By CAPT. H. J. ROUND, M.C., M.I.E.E. Pp. vii+88; figs. 54. London: Cassell & Co., Ltd. Price 2s. 6d. net.

The introduction of the shielded four-electrode valve has probably been the most important advance made in radio receiving circuits during the last year, and Captain Round has been amongst the foremost, if not the foremost, experimenter to show how this form of valve can be used in practice. He has been working on the screened grid valve for the last three years, and this book is really a summary of the more important conclusions at which he has arrived. For anyone who is going to take up this particular line of research or for anyone who is going to fit up a set with one of these valves this little book will prove of the utmost value, and a careful study of it will save many a pitfall.

Ever since the early days of valve working the capacity between the grid and plate in high-frequency circuits has given infinite trouble to the designer, and as the characteristics of valves have improved so has this trouble increased. Up till now the best method of getting over this capacity effect has been the use of neutralising circuits in some form or another, but it has always been the dream of receiving experts that some day this capacity could be cut out altogether. Capt. Round shows us that the day has arrived, and its arrival is largely due to his work and that of Dr. Hull in America. This type of valve allows of the control of large values of high-frequency magnification, and so permits the designer to simplify the rectification and low-frequency circuits in his receiver, and thus obtain better quality in a simpler manner. Captain Round thinks that it will eventually give us simpler operation as well, a most important item in broadcast receivers. In fact, a reader of this book cannot fail to be impressed not only with the enormous advance that can be made in high-frequency amplification by the use of screened valves, but also by the numerous subsidiary advantages that are ensured by their adoption in receiving circuits. At present they suffer from being expensive and a little tricky in use, but time will banish these youthful defects.

Principles of Radio Communication. By JOHN H. MORECROFT, assisted by A. PINTO and W. A. CURRY. Pp. xiv+1,001, with numerous illustrations. New York: John Wiley & Sons. London: Chapman & Hall, Ltd. Price 37s. 6d. net.

A great number of text-books on radio communication has been published during the last few years, but hardly any deal, as this one does, with the whole subject in a comprehensive manner. The first edition was published in 1921 and at once attained the position of a standard work on the subject. Six years have seen extraordinary progress in the art, and this second edition will be welcomed not only by students but also by radio engineers who, though specialising on certain lines, must of necessity keep abreast of the principles underlying the latest developments in others.

Many books with similar titles do not attempt to act up to them, but this cannot be said of Mr. Morecroft's book. It really does describe the principles of the subject. We do not pretend to have read through the whole of this edition, but we have examined those portions which deal with aspects of the subject that have been recently developed. In some respects our interest in this country is perhaps rather concentrated on certain developments which may not loom so large in the eyes of those across the Atlantic, as, for instance, the developments of beam signalling and of high power valve transmission. In both of these we rather pride ourselves on being successful pioneers, and a similar book written in this country would have dealt with these matters far more fully. The same might be said as regards machine telegraphy and the latest developments of directional apparatus generally, though we cannot here make any boast of being pioneers. Apparatus for the automatic reception of distress signals have only been developed very recently, but as we were the first to develop them they would no doubt have been considered in a book written in this country. A certain amount of matter therefore is omitted which is of special interest to us at the present time, but we must remember that some of it might hardly come under the title, and Mr. Morecroft rightly sticks to his title of principles. On principles it is a comprehensive book, and we must not cavil at the omission of applications, however interesting they may be. It is indeed a book that will be valued by established radio engineers as well as by those who are still climbing the ladder.

Business and Industrial Notes.

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations and Failures.

E.D.A.'s Annual Dinner.

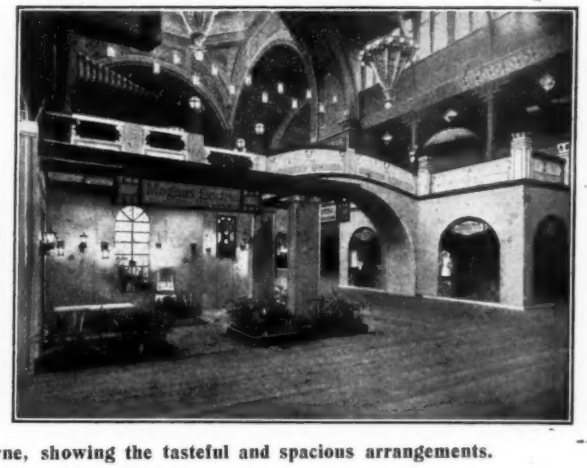
The annual dinner of the British Electrical Development Association will take place on Friday, March 16th, at the Savoy Hotel. The speakers will include the President-Elect; Mr. Archibald Page (president I.E.E.); Mr. Frank Hodges (Central Electricity Board); and Mr. L. B. Atkinson. During the reception and dinner there will be selections of instrumental music. The vocalists for the entertainment following the dinner will include Miss Dora Labette and Mr. Thorpe Bates.

Polish Tariff Increase.

To meet the depreciation of the zloty since the present duties were fixed the Polish Government is increasing the rate of import duty on a number of classes of goods by 72 per cent. Among the classes affected, according to the *Board of Trade Journal*, are "cathode lamps (for wireless)" and "apparatus for wireless stations."

The Australian Electrical Exhibition.

Mr. Walter Richards, secretary of the successful All-Electrical Exhibition held in Melbourne in the latter part of last year, has sent us two photographs of that display. These are reproduced herewith, and they show a spaciousness which is not common in such exhibitions. The first view is of an excellent model farm constructed in a most detailed manner. The principal feature of the other picture is a display of lighting fittings. It is of marked simplicity, comparing favourably with the crowded collections which are so often seen. The Edison Swan Co.'s stands are to be seen on the right of the illustration.



Two Views of the All-Electrical Exhibition, Melbourne, showing the tasteful and spacious arrangements.

A Proposed Insulator Factory at Plymouth.

A proposal that the porcelain industry established at Plymouth and made famous by Cookworthy, but subsequently allowed to languish and disappear, shall now be re-established and developed by 100 local business men, each contributing £100 as capital, is strongly supported by Mr. S. Gordon Monk, head of the electrical engineering department at Devonport Technical College. Mr. Monk points out that the china clay is on the spot and there is an increasing demand for high-grade porcelain for high-voltage electrical work. The National Electricity Scheme has begun, the Central Scotland area is being now developed, and South-East England will be the next. For this work alone a few million special grade insulators are required. The fact that Canadian firms advertise in the home market shows that there is a demand. Cookworthy, he says, left Plymouth ostensibly to get nearer the fuel for the firing. This excuse does not hold good to-day, because much better means of firing than the coke oven are available. Besides oil fuel, we have the best form of all now—the electric furnace. The temperature is under automatic control, and the consumption of energy is comparatively small, because all the heat produced is utilised. Not only can they produce electrical energy as cheaply as elsewhere, but there is a fair amount of water power available in Devon and Cornwall in small quantities. An electric furnace is being installed in the College, and Mr. Monk proposes to carry out trials on electrically-fired porcelain to see what can be done with small units.

The Bristol Electric Club.

The monthly meeting of this club was held at the Grand Hotel, Bristol, on February 17th. Over one hundred members attended. The chairman, Mr. Baker, referred to the death of Mr. W. Nairn, the chief electrical engineer of the Bristol Tramways and Carriage Co., Ltd., who was a member, and the members stood in silence as a mark of respect. Dr. Rixon, president of the Bristol Rotary Club, lectured on "Occultism," and Mr. D. Irving Gass gave a selection of Somerset dialect stories. Musical and other items were ably rendered by Messrs. Davies, Perks, Denman, White, and Southwell, the accompanist being Mr. Frank Lynas. The next meeting of the club will be held at the Grand Hotel on March 16th, when the chief item of the evening will be a talk on music by Mr. Frank Wiltshire.

Social Events.

The Metropolitan-Vickers Dramatic and Operatic Society during last week performed an original musical comedy entitled "Prudence and the Pilot." The libretto, lyrics, and music were all written and composed by members of the Society, who also designed the scenery and designed and made the fancy costumes. The leading parts were taken by Miss E. Ratcliffe and Mr. W. Ball. The piece has been entered for the competition for the best musical show being held by the National Dramatic and Operatic Association. There are 50 competing societies scattered all over the country, but the "Metrovick" is the only one to put up an original piece written, composed, staged and played exclusively by its own members.

The London Electric Wire Co. & Smiths, Ltd., held its third annual dance at the Hotel Metropole on February 17th. Over 200 employés and friends attended the dance, which lasted until 2.30 a.m.

The fifth annual ball of the Blackburn tramwaymen was held on February 22nd, and attracted a gathering of about 600. The mayor attended.

American Cable Exports.

During last year only 494 tons of insulated wire and cable were exported from the United States, as compared with 738 tons in 1926.

British Magnetos in the Australian Flight.

By his wonderful solo flight in a light aeroplane from England to Australia in 16 days, Captain Hinkler, the Australian airman, has won a further triumph for British aviation. For this journey of 12,000 miles he used magnetos of a standard 4-cylinder motor-car type manufactured at the Coventry works of the British Thomson-Houston Co., Ltd., whose magnetos were also used by Major Segrave and Captain Malcolm Campbell in their record-breaking runs at over 200 m.p.h.

The Stockport Contract.

On Monday last the Stockport Town Council again considered the question of the purchase of a 20,000-kW turbo-generator. It will be recalled that the contract was awarded to Messrs. Escher, Wyss & Co., Zurich, at the price of £35,151 —£17,000 below the lowest British tender. Then, at a later meeting, the contract was withdrawn, and it was decided to advertise anew. At last Monday's meeting the original decision to purchase the Swiss plant was confirmed by 33 votes to 32. An amendment proposing that the Electricity Committee should prepare a report upon the respective merits of British and foreign plant, and that the President of the I.E.E. should be asked to nominate someone to consult with the borough electrical engineer was defeated.

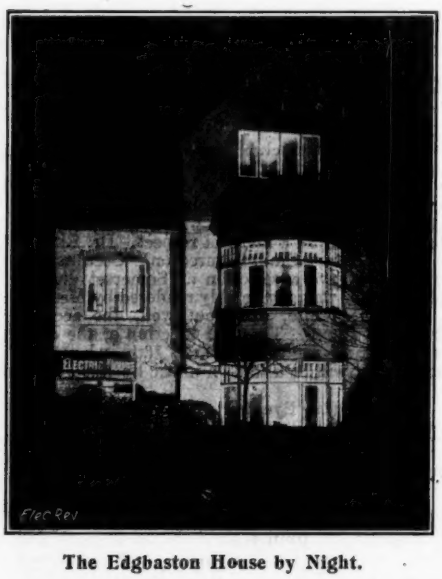
Barnsley.—The first exhibition organised by the Corporation Electricity Committee proved very successful. The preparations were made by Major Barker, borough electrical engineer, and the Barnsley branch of the Electrical Contractors' Association took a prominent part in the display of appliances.

Czecho-Slovakian Electrical Imports.

The *Board of Trade Journal* states that during December last electrical machinery valued at 35,000,000 Czech crowns was imported into Czecho-Slovakia. This made the total for the year 255 million cr. (about £1,500,000).

British Goods Exhibited in Melbourne.

Last week the Governor-General of Australia (Lord Stonehaven) opened an exhibition of the products of British manufacturers in Melbourne. The collection is a comprehensive one, and in it electrical apparatus is included. The exhibition is to remain open until April.



The Edgbaston House by Night.

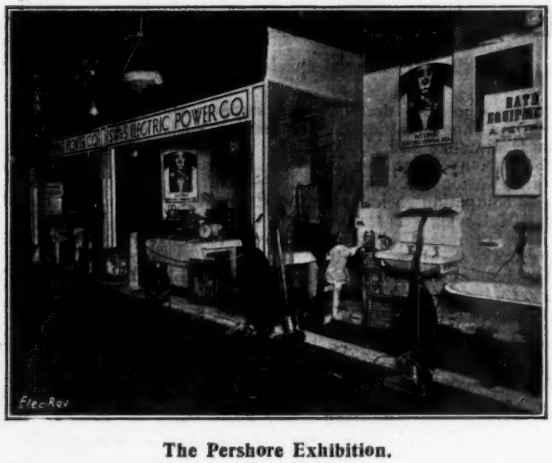
Well-known Birmingham People at the Opening Ceremony.

Birmingham's Latest Electric House.

The accompanying photographic views show by night and by day the Birmingham Corporation's electric house which has been opened at 367, Hagley Road, Edgbaston, Birmingham, as a feature in the E.D.A. Circle Campaign, 1927-28. Some familiar personalities in the electrical life of the city will be recognised. This house was opened on February 13th by Lady Brooks, and we understand that very good attendances have been secured. Down to date 103 demonstration houses and local exhibitions have been, or are being, organised in connection with the campaign.

Local Exhibitions.

Pershore.—We recently reported that an electrical exhibition had been held at Pershore under the auspices of the Shropshire, Worcestershire and Staffordshire Electric Power Co. A part



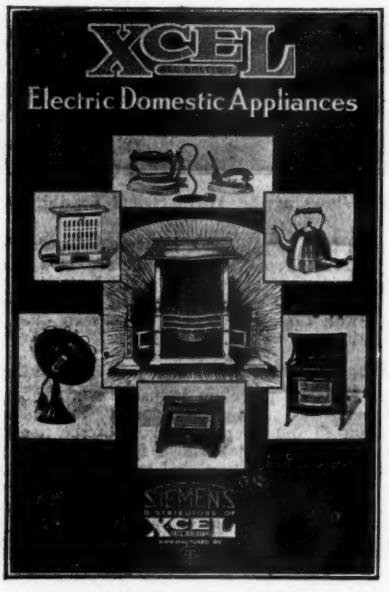
The Pershore Exhibition.

of this show, which is one of a series which the company is running in various parts of its extensive area, is depicted in the accompanying illustration.

Clayton.—A week's exhibition of electrical domestic and other appliances was held last week, by the Urban District Council, which has recently inaugurated an electricity supply (purchased in bulk from the Yorkshire Electric Power Co.). Mr. W. B. Woodhouse, general manager of the Power Company, was present, and congratulated the Council on the way in which it had overcome initial difficulties.

A Siemens Domestic Showcard.

Accompanying this note we give a reproduction of a very neat showcard of Xcel electrical domestic appliances that has recently been issued by Siemens Electric Lamps and Supplies,



A "Siemens-Xcel" Showcard.

Ltd., of Upper Thames Street, E.C.4, to a large number of its customers. Copies of the showcard will gladly be sent to any dealer who has not already received one.

Unemployment.

The total number of persons on the registers of Employment Exchanges in Great Britain on February 13th was 1,159,800. This was 2,353 fewer than on February 6th, and 110,417 fewer than on February 14th, 1927.

The Position of the German Electrical Industry.

The Berlin correspondent of the *Financial Times* says that in the course of his address at the annual meeting of the Siemens & Halske Co., Dr. Carl von Siemens said that although the present position was satisfactory, there was no guarantee that it would continue so. Local authorities, upon whom the company relied to a great extent, were restricting their orders. Seventy-five per cent. of the electricity used in Germany was produced by State or communal concerns, and it was questionable whether that policy was the right one or whether more private freedom should be permitted. He spoke also of the growing difficulties which business in foreign countries encounters; for example, foreign buyers are often not permitted to include German telephone apparatus in the public network of lines or to measure current with a German meter or to drive a lathe with a German motor. Requests had been received from several countries to erect factories there for production. "But," he observed, "it is not in our interest to invest our money in foreign factories, and, moreover, we have learned through bitter experience how weak is the foundation in wartime of property rights in such plant, notwithstanding the provisions of international law."

New Swiss Company.

La Société Soudure Electrique is the name of a new concern which has lately been organised in Lausanne to manufacture electric welding plant.

New French Companies.

La Société Industrielle des Transformateurs Goetz and Brulé is the name of a new company which has been formed at Pierrefitte (Seine), with a capital of 500,000 fr., to manufacture transformers.

A company has been formed in Paris (74 Rue Roquepine) with a capital of 1,200,000 fr. and the title La Société de Distribution d'Eclairage et de Force de l'Herault.

Trade Announcements.

Messrs. WATTS, FINCHAM & CO., LTD., state that although their Acton works have been destroyed by fire, they are arranging for temporary accommodation during rebuilding, and all orders will be completed promptly. The destruction of the engineering works in no way affects their other business.

Mr. A. F. WILLS announces that the business of the Electric Service Co. carried on by him at 14-16, West Princes Street, Glasgow, C4, was transferred on February 20th to Messrs. H. S. B. Lang, J. Lang, and R. D. Lang, who will continue it on their own behalf. All debts will be attended to by Mr. Wills at 939, Sauchiehall Street.

Messrs. GILLITT & CO., wireless dealers, of Whitehaven, are shortly removing their business to new premises at 26b, Lowther Street.

Mr. H. STANLEY SMITH, electrical and radio engineer, of 7, South Colonnade, Hastings, has acquired the business of the Sussex Wireless Co., of 178, Queen's Road, at that town.

Messrs. A. E. HORNSBY & CO., electrical engineers, of Gillingham, Kent, have removed to 22, High Street.

Messrs. W. & B. ROBINSON, electrical and wireless engineers, have acquired the business of Mr. C. Banham, of Wakefield Road, Ackworth, Yorks.

BRITISH B.A.G., LTD., has appointed the Holland House Electrical Co., Ltd., 247a, St. Vincent Street, Glasgow, its sole agents for Scotland.

New Catalogues and Lists.

Brochure containing a number of whole-page illustrations of various types of electrical machines produced by the ATELIERS DE CONSTRUCTIONS ELECTRIQUES DE CHARLEROI.

THE HART MANUFACTURING CO., 76 & 76b, Rochester Row, S.W.1.—General Catalogue No. 10, containing illustrated details and prices of "Diamond H" switches, including remote control patterns; a heater control and electric range switch manual containing very full particulars and diagrams of various switching methods; and a manual of remote control equipment dealing with the employment of "Diamond H" switches.

MR. A. L. CURTIS, Westmoor Laboratory, Chatteris.—Fourth edition of 32-page booklet relating to sands, clays, and economic minerals for all industrial purposes.

Mr. A. M. SAULTER, 240, Lower Road, London, S.E.8.—Folders relating to Saulter's patent coiling and packing devices and metal reels for cables and other material.

GRAFTON ELECTRIC CO., 54, Grafton Street, Tottenham Court Road, London, W.1.—A 104-page catalogue (fifth edition) particularising with illustrations and prices a great variety of electrical, radio, and other accessories, tools and parts.

AUTOMATIC & ELECTRIC FURNACES, LTD., Elecfurn Road, North Road, Holloway, N.7.—An illustrated publication dealing with "Wild-Barfield" electromagnetic furnaces for the automatic hardening of steel.

HOUGHTON-BUTCHER (GREAT BRITAIN), LTD., 88-89, High Holborn, W.C.1.—"Houghton's Radio News" for February containing illustrated notes upon, and prices of, apparatus.

THE GUTTA PERCHA CO., Wharf Road, City Road, N.1.—A publication dealing with magnetic alloys, describing "Numetal" and "Rhometal," and one containing particulars of "Pyromic" high-temperature electrical resistance alloys.

THE ENFIELD CABLE WORKS, LTD., Lincoln House, 296-302, High Holborn, W.C.1.—A trade price list of v.i.r. and pure rubber flexible wires, &c.

MESSRS. SIEMENS BROS. & CO., LTD., Woolwich, S.E.18—Sections Nos. II, V and VIII of the company's joint box catalogue, dealing, respectively, with l.p. disconnecting boxes; sealing ends and dividing boxes; and service fuse boxes with porcelain-handle fuses. Fully illustrated.

VOLTA, LTD., Kern House, 36-38, Kingsway, W.C.2.—The first number of the "Volta Viewpoint," a bulletin for the trade, containing notes on the selling of the company's cleaners.

MESSRS. PETTERS, LTD., Yeovil.—An illustrated folder containing details and prices of "Petter-Light" small generating sets.

MESSRS. SMITH & ANSELL, LTD., Stockfield Road, Acocks Green, Birmingham.—A well-illustrated price list of electric lighting fittings, including pendants, bowls, lanterns, standards, &c.

MESSRS. E. P. ALLAM & CO., LTD., 107-109, Gray's Inn Road, W.C.1.—Stock list of d.c. motors of various makes.

THE HENDON ELECTRIC LAMP CO., LTD., 104, Southampton Row, W.C.1.—Two illustrated and priced leaflets, dealing respectively with an electric toaster and a bowl heater, belonging to a series for which the company supplies a folder.

BRITISH B.A.G., LTD., 23, Farringdon Avenue, E.C.4.—A price list of "Vitrina" shop-window lighting fittings.

Bankruptcy Proceedings.

P. L. LITTON, trading as Moore & Litton, engineer, plumber and electrical engineer, 12, Bath Road, and 50, Culverland Road, Exeter.—The receiving order herein was made on February 6th, on the debtor's own petition. According to the statement of affairs the liabilities expected to rank are £787, against assets estimated to produce £200, leaving a deficiency of £587. Debtor attributes his failure to undertaking work, owing to competition, at prices which were unremunerative, bad debts, and law costs. In April, 1924, debtor joined another in partnership, and they traded as engineers, plumbers, and electrical engineers. He contributed £30 cash capital, and his partner furnished between £40 and £50 in stock and £3 in cash. In December, 1926, the partner died, and debtor continued the business. On February 25th, 1927, he entered into an agreement with his partner's widow whereby he took over the business and promised to pay her a weekly amount for life. Debtor first became aware of his position about last November, but continued to trade, hoping to obtain more work.

The first meeting of creditors was held on February 24th at the Official Receiver's offices, Exeter, when the case, being a summary one, was left in the hands of the Official Receiver as trustee of the estate. The following are creditors:—

	£		£
Moore, Mrs.	381	Rowe Bros. & Co., Ltd.	50
Bankers	60	Sutton & Bridgeman ...	139
Metro - Vick Supplies, Ltd.	28	St. Helens Cable Co., Ltd.	30
Otton & Son	26		

A. E. STIMPSON, 95, High Street, Watford, electrical and general engineer.—A statement of affairs presented at the recent public examination of the above debtor at the Court House, St. Albans, disclosed liabilities of £1,129, and assets of £244, leaving a deficiency of £885. Debtor stated that he commenced business as an auctioneer in October, 1926. In June, 1927, he advanced money to an electrical company in respect of a bill of sale for £75 over stock-in-trade, which three weeks later he sold by auction for about £45, and immediately afterwards commenced to carry on business from his own office as an electrical and general engineer. He entered into a contract to install electric light in fourteen houses at Boxmoor, but only one installation was completed, for which he received £3 on account; a balance of £3 was still owing. Judgment was obtained against him in October last in respect of arrears of rent, and the present proceedings were instituted. The Official Receiver remarked that the debtor's books of account had been well kept. Debtor attributed his failure to lack of capital, pressure by creditors, and insufficient profits to pay expenses. The examination was adjourned.

S. J. VINCE, St. Albans Road, Hatfield, Hertfordshire, formerly 111, Great Portland Street, W.1, trading as "The P. and L. Manufacturing Co."—The public examination of this debtor was held on February 15th, at the Court House, St. Albans. The statement of affairs disclosed liabilities of £825, against assets of £50, leaving a deficiency of £775. The failure was attributed to lack of capital and to the borrowing of money for business purposes. In 1919 the debtor entered into partnership with two others, and they commenced business as lamp shade manufacturers. He provided £225 capital, and his partners put up £225 and £500, respectively. In June, 1921, the business was taken over by a limited company of wholesale electrical distributors, and his partners also received shares. Debtor was appointed sales manager on a commission basis, but in 1925 the company went into liquidation. In August, 1925, he commenced as a manufacturer's agent for wooden standards and electrical fittings as the P. & L. Manu-

facturing Company with £50 advanced by another, who subsequently advanced further sums of £450, a charge being given to him as security, which included all the accruing book debts. In December the lender took possession and collected the book debts to the amount of nearly £450. Debtor then placed in the custody of two of his creditors his stocks of electrical fittings, worth about £40. He admitted that he became aware of his position in January, 1926. The examination was adjourned.

J. T. NICHOLS, wireless parts merchant, late of 4, Glebe Road, Kingsland Road, Dalston.—An application for an order of discharge was made on February 24th to Mr. Registrar Francke at the London Bankruptcy Court on behalf of this bankrupt, who failed in June, 1927. Mr. E. Parke, Official Receiver, reported that in January, 1925, debtor contracted with the petitioning creditors to supply them with goods, and did so both before and after September, 1925, when they converted their business into the Reflex Radio Co., Ltd. A sum of £523 was owing when that company went into liquidation in May, 1926. The bankrupt sued the petitioning creditors for the amount; they defended the action on the ground that the company was liable, and there had been novation; judgment was given against the bankrupt with costs for £177. In April, 1927, the bankrupt sold his business to his two sons, who, in turn, transferred it to D.X. Coils, Ltd. The Official Receiver opposed the application on statutory grounds, and charged the bankrupt with misconduct in disposing of his assets without making any provision for the payment of the claim of the petitioning creditors, which was practically his only liability. No assets were disclosed, but a sum of £150 had had been received in respect of the bankrupt's claim upon the Reflex Radio Co., Ltd. Mr. P. Mordant, the trustee under the bankruptcy, said he did not oppose the application. Mr. Oscar Kean asked the Court to override the charge of misconduct, pointing out that had the bankrupt not adopted the course pursued, the trade creditors (other than the petitioning creditors) would not have been paid at all, and the petitioners would not have received one penny more than they did under the offer of shares. The transaction was certainly beneficial to the general body of creditors. His Honour said that the misconduct was only of a technical character, and the discharge would be suspended for three months.

A. H. CRUMP (Selwyn Electrical Engineering Co.), electrical engineer, 184 and 220, Walworth Road, S.E.17.—Receiving order made February 21st, on debtor's own petition. First meeting March 5th; public examination April 18th, both at Carey Street, W.C.

W. H. DICKSON and A. J. SOLOMON (Dickson & Solomon), electrical and wireless engineers, 13 & 14, Tavistock Street, Devonport.—Last day for proofs for dividend, March 17th. Trustee, Mr. A. N. F. Goodman, 11, St. Aubyn Street, Devonport.

A. F. KINGDOM, electrical and mechanical engineer, late of Tavistock Street, Devonport.—Last day for proofs for dividend, March 17th. Trustee, Mr. A. N. F. Goodman, 11, St. Aubyn Street, Devonport.

H. A. PRATT, electrical engineer, Essex House, Lee Road, Dovercourt.—First meeting held February 28th, at 9, Arcade Street, Ipswich. Public examination March 8th, at the Law Courts, Colchester.

W. J. WARREN (Coleman & Warren), wholesale electrical supplies, 66, Victoria Street, S.W.—Last day for proofs for dividend March 10th. Trustee, Mr. D. Williams, Official Receiver, Carey Street, W.C.

F. A. WILLIAMS, electrician, 96, Churchill Road, Great Yarmouth.—First and final dividend of 1s. 11d. in the £, payable at the Official Receiver's office, 9, Queen Street Chambers, Norwich.

Company Liquidations.

HERRICK, DURELL & CO., LTD., electrical engineers and contractors, 92, Park Street, Camden Town, N.W.—The summary of the accounts filed under the liquidation of this company shows liabilities of £2,973, assets valued at £527, and a total deficiency of £3,149 with regard to contributories, the issued capital being 2 ordinary and 701 preference shares of £1 each. Mr. G. D. Pepys, Official Receiver, has reported that the company was formed as a private company in July, 1924, to acquire and carry on a business of electrical engineers and contractors, previously carried on by Roland Herrick, formerly Hinrichs. The purchase price for the goodwill and assets was fixed at £800 in cash, the goodwill being taken at £685, which the Official Receiver considers unjustifiable. £502 of the cash consideration was paid to Herrick, in return for which he took up 500 preference shares. The main business of the company was in contracting for electrical installation work; there were also a few maintenance contracts. The trading accounts showed a gross profit, but a net loss throughout of over £1,800. A debenture for £1,650 was issued in August, 1927, and in the following month Mr. C. A. Dodds was appointed receiver and manager on behalf of the holder. He continued to carry on the business for a short time, but stopped all work in October last, and a month later a winding-up order was made on the petition of a creditor. The receiver found that the debenture was invalid, having been issued within three months of the petition for a past consideration. The failure of the company is attributed to the taking of premises at Park Street, and the consequent loss on the trading thereat; also to excessive overhead charges. Mr. G. H. Hawkins has been appointed liquidator.

GENERAL RADIO CO., LTD.—A petition for the winding up of this company has been presented to the High Court by Messrs. H. Clarke & Co. (London), Ltd., of 65, Milton Street, E.C., creditors, and will be heard in London on March 5th.

NOTABLE ELECTRIC CO., LTD.—First meetings of creditors and contributories held February 29th, at Carey Street, W.C.

BRITISH ELECTRIC & GENERAL INSULATORS, LTD.—Winding up voluntarily. Liquidator, Mr. F. H. Harman, 8, Regent Street, S.W.1. A meeting of creditors was held at Strand House, Park Royal, on Monday last, February 27th.

TRENT BRIDGE RADIO CO., LTD.—A meeting of members is called for March 28th, at 44, Parliament Street, Nottingham, to hear an account of the winding up from the liquidator, Mr. E. H. Pearce.

The Engineer in Industry.

In an address to members of the Incorporated Society of British Advertisers at a luncheon at the First Avenue Hotel, High Holborn, on February 24th, Mr. A. J. Taylor, managing director of the Underfeed Stoker Co., Ltd., said that there was a real need for competent sales and advertising guidance for firms who had machinery to sell, new markets to develop, and old markets to hold and stimulate. This work could not be done by an ordinary firm of advertising agents. Technical advertising in this country was on an infinitely lower level than it should be. Manufacturers should pool some of their sales and advertising problems and so use a high grade of men. There was a definite shortage of skilled executives who would work, the supply of recruits from the public schools being definitely stopped for at least three years during the war. From a study of a number of key industries in different parts of the British Empire, Mr. Taylor said he had found their profitable expansion retarded, in many cases, by lack of appreciation of the services that properly trained engineers could render if taken into the councils of the executive and vested with responsibility and authority. The present industrial problems were essentially engineering problems. The United Kingdom produced engineers of outstanding ability and high technical skill, and it was to their efforts more than to any other single factor that we owed our reputation for excellence in the quality of our manufactured goods. Increased production was a science demanding specialised training and a high standard of technical ability. Hitherto, the engineer in industry had been regarded as the custodian of the manufacturing plant, charged only with its upkeep and maintenance. Henceforward he would have to assume greater responsibilities, both technical and executive, and must take an active part in the development of the plant and of the process which it involved. The skilled technician was never more essential to the well-being of the manufacturing industries than he was to-day, and it was in the interests of all concerned to encourage the industrial engineer and to raise his status as a professional worker.

Book Notices.

"Official South African Municipal Year Book, 1927-28." Pp. 509 and tables. London: E. G. Allen & Son, Ltd., 12 and 14, Grape Street, W.C.2. Price 25s. net.—The new edition of this municipal year book has again been brought up to date; data relative to municipalities and local bodies have been revised, the comparative statistics relating to finance, tramway undertakings, water supply, electric lighting, &c., being dealt with in a comprehensive manner. There are also several technical articles which should prove of use to those interested in local government.

"*Journal* of the American Institute of Electrical Engineers." Vol. XLVII. February, 1928. New York: The Institute. Price $1.

"Science Abstracts" (A. & B.). Vol. XXXI. Part 2. February 25th, 1928. London: E. & F. N. Spon, Ltd. Price 3s. each.

Price Reduction.

PHILIPS LAMPS, LTD., announces that the price of its h.t. supply unit for d.c. mains has been substantially reduced.

Recent Contracts.

The Leeds Corporation Electricity Committee has recommended the City Council to accept the tender of the British Thomson-Houston Co., Ltd., for two double-cylinder, 25,000-kW, 3,000-r.p.m. turbo-alternators for the new Kirkstall power station. The machines are rated at 35,714 kVA, 10,500/11,500 V, three-phase, 50 cycles, and the turbines are designed for a working steam pressure of 450 lb. per sq. in gauge at 750 deg. F. The total value of the contract, which was secured in the face of strong Continental competition, is £176,504.

ELECTRICARS, LTD., has received an order from the Borough of Leyton for a 30-cwt. "Electricar" low-loader for refuse collection work.

A contract has been placed with Messrs. BABCOCK AND WILCOX, LTD., for 62 electric cranes and a coaling plant, with a further two electric cranes, for the new port works at Recife, Brazil. This order was secured against world-wide competition. The company has also received an order for 22 electric cranes to be erected at Kilindini Harbour, Kenya Colony.

Australian Tariff Applications.

The Australian Tariff Board has recently held inquiries into applications from Commonwealth manufacturers for the raising of the import duties on air-break switches, switch fuses and circuit breakers, and electric lampholders.

The switchgear application was made by the Electrical Engineering Manufacturers' Association of New South Wales. The existing duties are 35 per cent. under the British preferential tariff, 45 per cent. under the intermediate tariff, and 50 per cent. under the general tariff. The applicants wanted the rates raised to 45, 50 and 55 per cent., respectively, for switches and switch fuses (or 3s., 4s. and 5s. if higher), and to 45, 55 and 60 per cent. for circuit breakers. It was stated that British makers were undercutting local products, but that was denied by the opponents. The lampholder application was made by a company said to have employed a capital of £15,000 and 22 persons. It was said that British and foreign competition had reduced the number of workers to five men and three boys. The present rates are 27½ under the British preferential tariff and 40 per cent. under the general tariff. The applicants asked for rates of 3s. 6d. and 5s. per dozen for all electric light lampholders (excepting miniature and screw socket patterns). The results of the inquiries have not yet been announced.

For Sale.

Halifax Corporation Electricity Department invites offers for 200 old type C. & H., and Ferranti meters. Messrs. Leonard Carver & Co., in conjunction with Mr. H. J. Shaw, will sell by auction on March 7th and 8th, at 96 and 99, Weaman Street, Birmingham, stocks of wireless goods, telephones, wire, weldless tubing, &c. Finchley U.D.C. Electricity Department invites offers for two 350-kW d.c. Belliss-E.C.C. generating sets. Guildford Corporation Electricity Department invites offers for surplus generating plant. (See our advertisement pages to-day.)

Prices of Raw Materials.

Messrs. James Forster & Co. reported on February 25th:—"There is little change to report in lead this week. From all centres of consumption a poor demand is being experienced, and there are no signs as yet of a curtailment in supplies, though arrivals in this country this year have not been excessive. The lock-out of metal workers in Germany has been averted, but a settlement has still to be arrived at between owners and miners at Broken Hill. The present price of lead is certainly a reasonable one, but until there is a radical change in the present position of supply and demand we can see no justification for higher prices."

Messrs. F. Smith & Co. and Messrs. James & Shakespeare report, February 28th: No change in copper prices.

Messrs. James & Shakespeare report, February 28th: English pig lead, £21 5s., 5s. increase.

Messrs. Edward Till & Co. report, February 28th: India-ruber, Para fine, 1s. 0½d., 1½d. dec.

Lighting and Power Notes.

Bexhill.—ELECTRICITY EXTENSIONS.—At a recent meeting of the Corporation Electricity Committee the report of the electrical engineer dealing with additions to plant, provision of additional feeders and distributor cables, &c., to maintain efficiency and meet additional demands during next winter, was submitted, and the Committee decided to recommend the provision of the following plant:—One 500-kW Bruce Peebles 11,000/500-V motor convertor, connecting cables and l.p. switchgear, £4,428; foundations, cable trenches, &c., £150; h.p. switchgear at Ashdown Road and Little Common, £754; duplicate transmission lines (11,000 yards), from Ashdown Road to Little Common, £9,212; earth-leakage test panel, £50; feeders and cables, £3,547.

Brentwood. — INSTITUTION SUPPLY. — Recently the Essex County Council applied for the sanction of the Minister of Health to borrow £22,778 for the installation of electrical plant and wiring at Brentwood Mental Hospital. The Minister, after holding a local inquiry, has intimated that the case is not such as would justify his departing from the Government's general policy of encouraging generation of electricity in bulk, and he therefore cannot consent to the Council raising a loan for carrying out the proposals. The matter has been referred to the Committee of Visitors.

Brighton.—LOANS.—The Corporation Electricity Committee is applying for sanction to the borrowing of £4,900 for laying l.p. feeders in the central portion of the town.

Sanction has been received to the borrowing of £190 for the provision of voltage regulation equipment; £3,024 in respect of the concrete monolith and raft for the new turbo-alternator; £5,880 for the purchase of freehold property in Spring Gardens and Church Street; £9,000 for accessories in connection with the new boiler plant; and £18,706 for the installation of e.h.p. switchgear at the Southwick power station.

NEW BOILER PLANT.—The Committee has decided that No. 2 Yarrow boiler at the generating station shall be equipped with a class "L" type forced draught mechanical stoker in lieu of the present oil firing equipment at an estimated cost of £4,500.

Bury.—WIRING OF SMALL HOUSES.—The borough electrical engineer has been instructed to submit a report to a committee on the question of the wiring of houses on the payment by instalment plan.

Canada.—HYDRO-ELECTRIC DEVELOPMENT.—It is reported that contracts have been awarded for a 65,000-h.p. hydro-electric development on the Back River, or Rivière des Prairies, seven miles from Montreal, for which undertaking the Montreal Island Power Company was incorporated in 1927. The total value of the works, including dams and equipment, is estimated to reach about $8,000,000. The Montreal Light, Heat and Power Consolidated has contracted to purchase the entire output of electricity for 30 years, and it is expected that the initial installation of 40,000 h.p. will be in operation by the end of 1929.

Messrs. Nesbitt, Thomson & Co., Ltd., of Montreal, state that plans are being considered for extensions to the plant of the Bathurst Co., Ltd., recently acquired by the Canadian Power and Paper Investment, Ltd. The construction programme is expected to include a 50,000-h.p. hydro-electric plant on the Nepisiguit River.

The Manitoba Government has prepared a comprehensive scheme for the extension of the Provincial hydro-electric system from time to time so as to meet the power requirements for the next 30 or 40 years. A complete plan has been adopted for covering the Province with a network of transmission lines in order to obviate the necessity of making a survey of the route every time a fresh application for power is received. As the result of negotiations which are now under way between municipalities and the Government, considerable extensions of the system are in prospect for the immediate future.

Continental.—RUSSIA.—Eight more regional power stations (three using peat, two hydro-electric, and three using low grade coal) with a total capacity of 197,000 kW, have been established in the Soviet Union. Sixteen power stations are under construction (five hydro-electric, three using peat, two using anthracite, three using low-grade coal, and three using "mazout") with a total capacity of 546,500 kW. The total capacity of all the Union power stations, those operating and under construction, including the increase in capacity of the municipal power stations at Leningrad, Moscow and Baku, which are being enlarged, amounts to 1,084,500 kW.—*Reuter's Trade Service* (Moscow).

GERMANY.—The Electro-Works Company, of Berlin, which is a State-owned undertaking and operates a power station in the central lignite district, reports an increase in the sales of electricity in 1927. The capacity of the works, which was 400,000 kW in 1926, will be raised to 450,000 kW when the extensions now in progress have been completed. The production in 1927 amounted to 1,677 million kWh, as against 1,496 millions in the preceding year, the output of lignite having been 4,100,000 and 3,700,000 tons in the two years respectively.

The Rheinisch-Westfalisches Elektricitätswerk Gesellschaft, one of the largest electricity supply undertakings in Germany—its sales during the last financial year amounted to 1,246 million kWh—is engaged in linking up not only its own power stations, but those of other supplying companies, so that any of the stations can come to the aid of the others in case of sudden excessive loads or breakdown. All the western plants of the R.W.E., in particular those at Goldenberg, Essen, Reicholz, Wesel, Fortuna, and Munich-Gladbach, are connected by duplicate 100,000-V transmission lines. These plants are also connected by a 100,000-V cable with the joint station of the Barmen municipality and the Westphalian United Electricity Supply Co. and with the Main power station at Hochstam-Main. Work is also in hand in connecting up the plants eastwards with the Ibbenburen station of the Lower Saxony Power Co. at Osnabruck and the Torf plant at Ruhle of the Heseper Torf Power Co. A 320-kV transmission line is also being erected between the station at Osnabruck and that of the Paderborn Electricity Works Co. At present the R.W.E. has about 690 miles of duplicate 100,000-V transmission lines in operation, as well as 22 transformer stations for pressures of over 100 kV. In South Germany, the R.W.E. has completed a 220-kV transmission line as far as Rheinau, near Mannheim, and an interchange of hydro-electric power is now being made with the Bayern undertaking by means of a connection between Hochst and Aschaffenburg. The 220-kV line is to be extended from Rheinau to the Wurtemburg power station at Heilbronn to the North to Stuttgart and to the Ill power station in the Vorarlberg.

Fowey.—OVERHEAD LINES.—At a special meeting of the Town Council on February 21st, proposals arising out of the recent conference with the St. Austell and District Electric Lighting and Power Co. were considered, and it was decided to agree to the suggestions put forward by Mr. Gordon Tucker, Inspector to the Ministry of Transport, and acquiesce in the erection of certain overhead lines by the company instead of underground mains.

Grimsby.—NEW PLANT.—The Corporation Electricity Committee has decided to extend the works by the installation of two 10,000-kW turbo-alternators, with the necessary boilers, auxiliary plant, building, &c., one set to be installed forthwith and the second at a later date, when the Council considers that the expenditure is justified; and to borrow £120,000 to cover the cost of the first section of the proposed extension of the works.

Horsham.—Year's Working.—The accounts of the Urban District Council's electricity undertaking for the year ended March 31st last show a total revenue of £15,088, as compared with £13,981 in the preceding year. Working expenses amounted to £8,807, as against £6,078, leaving a gross profit of £6,280 (£6,321). After meeting capital charges there was a net surplus of £2,146, of which £1,819 was transferred to the district fund and the remainder to reserve. The previous year's working resulted in a surplus of £2,383. The electrical energy sold increased from 746,013 to 881,776 kWh.

Japan. — Electrical Development. — An order has been placed for the whole of the plant for the Aka-gawa No. 2 station, and it is reported that tenders are being invited for plant for No. 1 station on the same river. The plant for the station will include six sets each of 18,000 kVA.

Liskeard (Cornwall).—Inquiry.—An inquiry was held on February 21st, by Mr. J. A. Lee, for the Electricity Commissioners, into the application of the Liskeard Gas and Electric Co., Ltd., for sanction to establish a generating station in Barn Street. Mr. Lee said the Corporation's objection to the Special Order in respect of electricity charges, &c., was being considered by the Commissioners, and the only question to be dealt with at the inquiry was the objection of certain householders in the vicinity to the establishment of the generating station on the ground of noise, smell, and depreciation of property. Evidence was then taken, after which Mr. J. C. Isaac, secretary to the company, pointed out that although twenty or more people had signed a petition against the station only three attended to give evidence. The inspector subsequently visited the site of the station and the houses of the objectors.

Liverpool.—Electrical Development.—Mr. P. J. Robinson, acting borough electrical engineer, has prepared a report on the estimates for the year 1928-9, which was submitted to the City Council on February 22nd. Mr. Robinson states that the work done during the year now concluding, comprised the installation at the Lister Drive No. 3 station of the second of the 25,000-kW turbo-generators; and the completion of the switchgear and the second group of cooling towers. Transformers and switchgear are in course of erection to meet the rapidly increasing load. Additions and alterations to various substations have been effected, and supplementary plant has been installed. Extensions of h.p. mains to various static substations have been completed and additions have been made to the l.p. distributors to meet the demand for all purposes, including new residential areas and public street lighting. The demand for supply of electrical energy for domestic purposes, including heating and cooking, is still showing a marked increase, and at the present time the number of electric cookers which have been supplied on the hire system is approximately 3,150. Included in the estimates are items for the construction at Lister Drive of a boiler house with boilers and other auxiliary apparatus with pulverised fuel equipment. An amount has been inserted to cover the cost of the further extension to the power station by the introduction of a 40,000-kW turbo-alternator, together with the necessary boiler, plant, cooling towers, &c. Provision has also been made for transforming plant, switchgear for static sub-stations, and underground mains. The total estimated capital expenditure for the forthcoming year is £1,534,251, made up as follows:—Work done and goods delivered or in course of delivery, but not paid for, £496,014; plant and buildings, £460,000; substations, £126,640; mains, £451,597.

London. — Battersea. — The Borough Council Electricity Committee is applying for sanction to loans of £38,049 for mains and £15,951 for services.

St. Pancras.—The Borough Council has received sanction to a loan of £18,850 for converting plant and switchgear at the Tavistock Place and Regent's Park sub-stations.

Shoreditch.—The new sub-station of the Borough Council was formally inaugurated by Sir Andrew Duncan, chairman of the Central Electricity Board, on February 27th. The Mayor said that the Council had now introduced a free wiring scheme, with the result that electricity had been installed in some of the poorest houses in the borough. From the sub-station the company proceeded to the Haggerston power station, where the Mayor started a new 10,000-kW turbo-alternator.

Newcastle-on-Tyne.—Electricity Supply.—In an address to the Middlesbrough Chamber of Commerce on February 22nd, Mr. R. P. Sloan, chairman and managing director of the Newcastle-upon-Tyne Electric Supply Co., referred to the company's proposals to extend its area of electricity supply by including 3,680 square miles between the River Tees and the Humber and as far west as Harrogate. It was endeavouring to place the industrial and rural areas on an equitable basis by ultimately standardising charges throughout the whole area.

Palestine.—The Rutenberg Scheme.—Sir Alfred Mond, who is on a visit to Palestine, gave an interview on February 26th in which he declared that economic conditions were improving and gave promise of still further improvement. The success of the Rutenberg electricity scheme, he said, had surpassed all expectations, and it had now proved unable to cope with the demand for electricity.—*Reuter* (Jerusalem).

Plymouth.—Electricity Supply.—It is estimated that expenditure in connection with the electricity undertaking in the forthcoming financial year will be £155,155, and on account of street lighting, £28,486, an increase in the latter figure being due mainly to extensions of public lighting by electricity. The Electricity Committee has decided to re-submit to the Council its scheme for the sale of fittings and electrical apparatus for domestic use, with the recommendation that the hire-purchase system should be adopted in respect of electric cookers only.

Portsmouth.—Loan.—The Town Council is to apply for sanction to a loan of £8,000 for the installation of apparatus necessary to give a supply of electricity in bulk to the Petersfield Electric Light & Power Co., Ltd.

Price Reductions.—Reductions in the charges for electricity have been made or recommended in the following districts:—

Skipton.—Lighting: From 8d. to 7d. per kWh. Heating and power: From 4d. to 3d. per kWh.

Plymouth.—Lighting: From 4d. to 3½d. per kWh. Power: from 2d. to 1½d., less a percentage, to a flat rate of 1d. per kWh.

London.—*The Kensington and Knightsbridge Electric Lighting Co., Ltd.*—Lighting: First 4,000 kWh per annum, 4½d. per kWh; all energy in excess of this amount, 4d. per kWh. Power: A fixed charge of 7s. 6d. per h.p. per quarter, plus 1d. per kWh. Heating and cooking: 1d. per kWh.

Hampstead.—Lighting: Reduced to 3d. per kWh. Power, heating and cooking: ¾d. per kWh. Mr. J. Leadbeater, borough electrical engineer, claims that these are the lowest flat rates for domestic supplies in the United Kingdom.

Ripon.—Opposition to Bill.—The City Council has decided to oppose the Bill of the Cleveland and Durham County Electric Power Co. for authority to supply electricity to the city. The Corporation has already arranged for a supply of electricity from Harrogate.

Special Orders.—Application has been made to the Electricity Commissioners by the Power Development Co. for a Special Order authorising it to supply electricity in the rural district of Hursley.

The Commissioners have submitted to the Minister of Transport for confirmation Special Orders made by them authorising the Faringdon Electricity Supply Co., Ltd., to supply electricity in the parish of Great Faringdon, and the Leicestershire and Warwickshire Electric Power Co., to supply electricity in parts of the rural districts of Billesdon, Blaby, and Market Harborough.

Stoke-on-Trent. — Loans Sanctioned. — The Corporation Electricity Committee has obtained sanction to borrow £100,000 in connection with the extension of generating plant at the central power house, £22,840 in respect of mains, substation equipment, &c., and £30,000 in respect of electricity plant extensions.

Extension of Mains.—The Committee has considered an application from Messrs. R. Scrivener & Sons, architects to the Sutton trustees, as to the supply on the estate near Stoke Lodge, and has decided to lay l.p. mains at a cost of £3,000.

Mains at Longton are to be relayed at a cost of £1,100.

The Committee is to lay an e.h.p. feeder from the power station to Swan Passage sub-station, Hanley, at a cost of £5,250, and has approved the extension of mains for 3-phase supply in the centre of Hanley at a cost of £4,000.

New Sub-Station Equipment.—The borough electrical engineer has submitted a report upon the equipment of Marsh Street sub-station, Hanley, and the Committee has decided that one 400-kVA transformer shall be added to the transformer equipment at an estimated cost of £360, and alterations made to the ironclad h.p. and l.p. switchgear at a cost of £100.

Swansea.—Supply for Mumbles Railway.—At a recent meeting of the Corporation Electricity Committee, in connection with the electrification of Mumbles railway and the supply of electricity to the Swansea Improvements and Tramways Co., the borough electrical engineer reported on the expenditure to be incurred in connection with the supply of electricity for the railway, which includes the erection and equipment of the sub-station at Blackpill, additional switchgear at the main generating station and the cost of mains, and it was decided to apply for sanction to a loan of £20,290, the amount involved.

Change-Over.—The borough electrical engineer also recommended a change-over from d.c. to a.c. in the Pier Street district, and the installation of the necessary a.c. mains for this purpose at an estimated cost of £6,876, and the recommendation was adopted.

Torquay.—Street Lighting.—The Corporation proposes to replace the existing gas lamps by electric lamps as soon as possible, with a view to the whole town being lighted by electricity, and has asked the borough surveyor to prepare a list of the streets where gas lamps are existing, and the borough electrical engineer to report as to the cost of laying the necessary cable and converting these lamps to electricity.

Yarmouth.—Loan.—Application is to be made by the Corporation for sanction to a loan of £34,491 for mains, cables, assisted wiring, domestic appliances, &c.

Conference of Local Authorities.—It was reported at a recent meeting of the Corporation that the electrical engineers of Norwich, Ipswich, Yarmouth, and King's Lynn, have prepared a memorandum on the proposed interconnection of Norfolk and Suffolk electricity undertakings. A conference of local authorities will be held at Norwich, and a local inquiry held. The Corporation is to apply for a Special Order authorising it to supply electricity within a specified area under the interconnection scheme.

Tramway and Railway Notes.

Birmingham.—TRANSPORT PROPOSALS.—According to the *Electric Railway and Tramway Journal*, the General Purposes Committee of the City Council, which presented a report on March 1st, 1927, has now made a further report involving important projects and a heavy expenditure. The proposals put forward include the following:—An order prohibiting motor vehicles from remaining in the central streets other than those set aside as parking places is dependent upon the establishment of the new parking places, a list of which is submitted. The Old Wharf site is being prepared, and will soon be ready for parking cars. Other projects are a new tramway loading place in the Horse Fair; a new tramway terminus in Navigation Street between Suffolk Street and Hill Street; an island site in Martineau Street and Union Street. An offer has been made of £147,000 to the Governors of King Edward's School for the acquisition of a site of 2,902 yards, which will permit of the improvement of High Street and Union Street, and the provision of a tram terminus to obviate running into Corporation Street. With regard to the reconstruction of the tramway in Colmore Row, the cost involved (estimated at £100,000) is said to be not warranted by the traffic improvement which might be effected, and the city surveyor has been instructed to explore the possibilities of an improved terminus in Steelhouse Lane as an alternative.

Continental.—SPAIN.—The Eskilduna Works, of Bilbao, has recently completed the construction of 37 electric locomotives, stated to be the first so far completely built in Spain. The locomotives, which are intended for the Barcelona-Manresa and the Irun-Alsasua railways, are designed to work with 1,500 V d.c., are fitted with six motors, and can attain a speed of 56 m.p.h.

BELGIUM.—The Belgian State Railways are studying the possibility of electrifying the line from Brussels to Antwerp. Electric trains would be able to perform the journey in twenty-five minutes, and would be run at fifteen minute intervals.

The work of electrifying the section of the Antwerp-Lierre local railway between Wommelghem and Broechem has recently been completed, and electric trains are now being run on this section.

Japan.—NEW ELECTRIC RAILWAY.—An application for charter has been presented to the Hiogo Prefectural Office for sanction to construct an electric railway, eight miles in length, from the sea coast of Akashi to Sumoto on Awaji-shima.

NEW TRAMWAYS.—The I.G.R. is to construct the following tramways: From Kure-machi, Takaoka-gori, Kochi-ken, to Onomi-mura; Dazaifu-Machi, Tsukushi-gori, Fukuoka-ken, to Umi-machi, Kasuya-gori; and in Sappora-gori, Hokkaido. The total cost of the schemes is estimated at 670,000 yen.

Leeds.—TRACK RENEWAL.—The Corporation Tramways Committee is to relay the tramway track in parts of Burley Road.

London.—THROUGH-RUNNING.—The Highways Committee of the L.C.C. has recommended that an agreement be entered into with the Walthamstow Urban District Council for the through-running of tramcars between Liverpool Street and Chingford Mount.

TRAMCAR IMPROVEMENTS.—The Committee has also recommended that improved and rearranged seating be provided on a further 200 tramcars, at a cost of £43,000, making a total, with the alterations to 300 cars sanctioned by the Council on February 14th last, of £108,500.

Northfleet.—PROPOSED INQUIRY.—At a recent meeting of the Urban District Council, the clerk reported, in connection with the Gravesend and Northfleet electric tramways, that he had now been informed by the Minister of Transport that Col. A. C. Trench had been appointed to hold an inquiry into the condition of the tramway track, and that before holding the actual inquiry the inspector proposed to make an inspection of the tramways in question and then consider whether it would be necessary to hear further formal evidence in connection with the representations that have been made to the Minister of Transport by the Gravesend Corporation and the Council.

Southern Railway.—SUBURBAN ELECTRIFICATION RESULTS.—At the annual meeting of the Southern Railway Co., on February 21st, Brig.-Gen. the Hon. Everard Baring (chairman), in his report covering 1927, said that the number of passengers carried in the electrified area of the company's system was going ahead in leaps and bounds, and notwithstanding the opening of the City and South London Tube to Morden, which deprived the company of about four million passengers during the year, there was still an increase in the number carried in the electrified area of 7¼ millions, as compared with 1925. The extension of the electric services to Guildford, Dartford, Orpington and Sutton, which were brought into use partly in 1925 and partly in 1926, resulted in the expansion of receipts in these areas by £237,000, although 1927 was only the second year of operation by electric traction. The estimated capital expenditure for the current year included £1,140,000 for electrification work now in progress. This scheme included the electrification of the old Brighton and South-Eastern lines to Caterham, Tattenham Corner, Sutton, Epsom Downs, and Epsom Town stations. In the London area of the old South-Eastern and Chatham section the company had installed, or was installing, the colour-light system of signalling, the total cost of which would be about £450,000. The system would enable the company to close 17 signal boxes, with a consequential saving of over £19,000 per annum.

Yarmouth.—TRACK RENEWAL.—At a recent meeting of the Corporation it was decided to relay the Marine Parade tramway track at a cost of £8,000.

Telegraph and Telephone Notes.

Facsimile Transmission by Wireless.—Senatore Marconi, in a recent statement, said that, great as had been the developments of wireless since the introduction of the "Beam," he thought the developments of the next two or three years would be even more sensational. He was certain that before very long we should be in telephonic touch with all the Dominions. He was arranging for telephony between England and Canada in a month or two. Full Imperial development depended very much upon the attitude of the Government. Technically, the whole thing could be completed in a very few months, but with the Government rested entirely whether the scheme was encouraged or delayed. According to *The Times*, he said another immense development was the transmission of facsimiles of whole sheets of typescript in their original form. Very shortly they would try it to Canada. He was convinced that ultimately facsimile would supersede Morse. The Imperial "Beam" wireless services were carrying a larger volume of traffic than any other wireless services in the world, and in the next few months services would also be working from France, Germany, the United States of America, and Japan. Spain was about to open direct communication by "beam" with South and North America. Japan already had a wireless service to the United States, and was about to introduce direct wireless services with England, France, Germany, Italy, India, and Argentina.

France.—AUTOMATIC TELEPHONY.—Steady progress is now being made with the conversion of the Paris telephone exchanges to automatic operation. The work is to be extended over a period of ten years at the rate of about 40,000 subscribers' connections per annum. By the end of the present year, 6,000 automatic connections will be in operation to be followed by another 10,000 in 1929. The Diderot exchange will have 10,000 connections by 1929, while the Gobelins and Trudaine exchanges will follow each with 10,000 and the Vaugirard exchange with 8,000.

Hull.—TELEPHONE ESTIMATES.—The Corporation Telephones Department estimates for 1928-29 show a surplus, after paying royalty, of £11,075. The estimated income for that year is £119,220.

India.—TELEGRAPH SERVICE.—A definite advance has been made by the Telegraph Department in India with regard to the quick transmission of heavy Press messages to different stations at one and the same time. The Department has now carried out successful trials in transmitting messages to offices in different directions in one operation from Delhi. In this arrangement, the Baudot printing telegraph system of working is used. It is understood that the Department proposes to adopt this system of control in large telegraph offices which would enable engineers to get the best results out of the lines and apparatus available. With regard to the service between India and Burma, which has often been subjected to delays on account of damage to the line by storms, the difficulties are being overcome by a special system of wireless working, and delays to Indo-Burma traffic are now a rare occurrence.

State Cables and Wireless.—F.B.I. PROPOSAL.—The Federation of British Industries has written to the Chancellor of the Exchequer and the Postmaster-General urging that the transmarine services, wireless and cable, at present operated by the Government, should be transferred to commercial hands. The Federation points out that, in spite of high charges, there were deficits amounting to something like £1,500,000 a year on the telegraph services, wireless and cable, operated by the General Post Office. Commercial operation was more likely to have beneficial results, by relieving the taxpayer of the deficit .and by an improvement in the service. It was of importance that the "Beam" service should be developed in the interest of cheap and rapid communications, and the Government was asked to give an assurance that nothing would be done to hamper the freest and fullest development of wireless telegraphy.

The Telephone Service.—CITY EXCHANGE.—City employers have received visits from officials who have been instructing subscribers in the use of automatic telephones. An official said that it was intended to convert the City Exchange from the manual to the automatic system next month. He added that many of the subscribers would have a Holborn telephone number, which would mean that most City subscribers would have new numbers. Bishopsgate and Sloane will be the next to be converted, and it will take at least another four years before all the London exchanges become automatic.

Radio Notes.

China.—HARBIN.—The radio station at Harbin commenced broadcasting on January 1st. The wavelength is 445 metres, and its signal is COHB. It is said to be the largest station so far constructed in North China.

France.—BROADCASTING.—Though nothing is yet definitely known of the broadcast system that the Government is preparing, it would seem that the State monopoly project has been seriously compromised by recent events. The *Wireless Trader* reports that the mass of opinion, outside circles interested in State industry, is against State monopoly. On the other hand, the situation of wireless is now fundamentally altered inasmuch as the regulation of it is at last recognised as a question of national importance, and a settlement outside Parliament is no longer possible. It is doubtful whether anything will be done before the new Parliament meets, and the only certainty of the moment is that the Government has not taken sides either with the State monopoly party (Post Office officials), or the partisans of "controlled liberty" (the trade and most of the general public).

EIFFEL TOWER WAVE-LENGTH.—The wave-length of the Tour Eiffel station, now 2,650 metres, will be reduced to 1,400 metres before the end of the current year. This is a consequence of the decision of the recent Washington Congress, fixing at 1,340-1,875 the zone for long-wave stations. It is believed that the power of the station will at the same time be advanced to 100 kW.

Holland.—BROADCASTING.—The Second Chamber has passed a Bill providing for the official regulation of broadcasting. The new law will be incorporated in the Telegraph and Telephone Act, and will be put into effect by Order in Council. An amendment moved by the Right parties provides that the hours of transmission shall be equally divided between the different broadcasting societies, *i.e.*, neutral societies, Roman Catholic, Orthodox Protestant, &c. The Government proposed to levy a fee of ten florins (16s. 8d.) for each receiving set, but on the initiative of the Liberals this clause was dropped.—*Reuter* (The Hague).

India.—BROADCASTING.—The future of broadcasting in India is a matter for speculation. According to the Bombay correspondent of the *Daily Telegraph*, the company has apparently been unsuccessful in its attempt to obtain a subsidy from the Government of India, and Mr. Eric Dunstan, the manager, after having an interview with the Viceroy, has left for England to endeavour to interest wireless manufacturers in the provision of further capital to put broadcasting in India on a firm basis.

Irish Free State.—BROADCASTING.—At a recent meeting of the Free State Broadcasting (Advisory) Committee it was stated that the Committee had considered the suggestions received from listeners in response to the invitation recently issued. Thirty-eight letters were received from a total number of 27,000 licensees, and it was agreed that the criticisms and suggestions which they contained could not be accepted as sufficiently representative of general opinion on programmes to justify any serious attempt to frame programmes in accordance with them. It was found to be impossible to reconcile in any general way the views expressed. The Committee recommended, however, that the broadcasting officials should consider the letters carefully, with a view, so far as they might judge best, to framing programmes so as to preserve a fair balance between the various classes of programme items, while maintaining such a general standard of programmes as would ensure the value of broadcasting as a means of public education in the musical as well as in the general sense.

Sweden.—LICENCES IN FORCE.—The number of licences for radio broadcasting sets in Sweden during the past year rose by 85,574, an increase of more than one-third since 1926. At the end of 1927 there were 328,133 licensed sets, representing 54 sets for every thousand of inhabitants. This is claimed to be a world's record. The new broadcasting station at Motala, in Central Sweden, is said to be the strongest and technically the most modern in Europe.

Contract Information.

When "Contracts Open" are advertised in our "Official Notice" pages, the date of the ELECTRICAL REVIEW containing the advertisement is given in parentheses below.

Contracts Open.

Ashford.—March 12th. Electricity Department. One 600-kW alternator, suitable for direct-coupling to a Diesel engine. (February 24th.)

Australia. — MELBOURNE. — March 20th. Postmaster-General's Department. Loading coil pots complete with coils. (B.X. 4221.)*

April 10th. Induction coils and registers. (B.X. 4219.)*

April 17th. Telephone transformers. (B.X. 4220.)* Telephone cord weights. (B.X. 4214.)* Telephone switches. (B.X. 4223.)* Accumulator batteries, plates and separators. (B.X. 4193.)*

April 24th. Telephone transmitters and associated parts. (B.X. 4222.)* Cordless switchboards. (B.X. 4218.)*

April 24th. Contact pressure testers. (B.X. 4249.)*

March 21st. City Council. Insulated copper cables and service boxes. (B.X. 4250.)*

Bakewell.—March 24th. Board of Guardians. Electric lighting wiring and accessories at Poor Law Institution. Specification and quantities (deposit £1 1s.) from Mr. A. Hawes, clerk to the Guardians, Union Offices, Bakewell.

Barnes.—Electricity Department. H. and l.p. cables. (See this issue.)

Barrow-in-Furness.—March 8th. Electricity Department. Six or 12 months' supply of oils, engine room stores, &c., electrical stores, meters, cables, &c., and steam coal. (February 24th.)

Belgium.—March 12th. Belgian State Railway Exploitation Co., Brussels (Salle de la Madeleine). 100 tons of bronze telegraph wire in three lots, and 3 tons of annealed copper wire.

Blackpool.—March 19th. Electricity Department. E.h.p. feeders, l.p. feeders, distributors, disconnecting pillars, boxes and services. (February 24th.)

Bristol.—March 5th. Port of Bristol Authority. Three l.p. switchboards for the Royal Edward Dock extension. (February 17th.)

Chesterfield.—March 16th. Electricity Department. One 33,000-V, outdoor sub-station, complete with switchgear, transformers, and 6,000-V induction regulators. (See this issue.)

Colchester.—Electricity Department. L.p. cables. (February 24th.)

Crediton.—The Board of Guardians is inviting tenders for lighting the Institution by electricity.

Dartford.—March 6th. Electricity Department. 4,456 yd. e.h.p. cable and extension of e.h.p. switchgear. (February 17th.)

Dover.—March 7th. Harbour Board. Electrical sundries and electric cables. Mr. Rutley Mowll, Registrar, Castle Street (2s. 6d. for schedule).

Dublin.—March 24th. Borough Commissioners. E.h.p. and l.p. cables, cast iron and stoneware troughing section pillars, compound, &c. (See this issue.)

Dundee.—March 15th. Electricity Department. Steam, feed, blow-off water and drain piping. (February 24th.)

Edinburgh.—March 19th. Electricity Supply Department. Twelve months' supply of cables, conduits, pavement and road box frames and covers, house service fuse boxes, fuseboards and meters. (February 17th.)

Egypt.—CAIRO.—Egyptian State Railways, Telegraphs and Telephones, Chief Inspecting Engineer, Queen Anne's Chambers, Broadway, S.W.1. 3-core h.p. and l.p. armoured cable, transformer h. and l.p. switchgear.—*Reuter's* Trade Service (Cairo).

Kirkcaldy.—March 14th. Fife Education Committee. Electric lighting installations.—At the Buckhaven school additions (sched. 21s.); at the Burntisland Higher Grade school (sched. 21s.); at the Aberhill school additions (sched, 21s.). Mr. G. Sandilands, architect and master of works, Education Offices, Kirkcaldy.

Leeds.—March 13th. Tramways Committee. Materials required during year ending March 31st, 1929, including: Electrical sundries, electrodes, &c. Specification from Mr. W. Chamberlain, general manager and chief engineer, 1, Swinegate.

March 9th. Board of Guardians. Laying cable, with the necessary tubing and wiring for the electric lighting of the disinfector house at St. Mary's Infirmary. Specifications from Mr. J. H. Ford, clerk to the Guardians, 11, South Parade, Leeds.

London.—METROPOLITAN ASYLUMS BOARD.—March 21st. General engineering work, including steam plant, steam and condense mains, h.w.s. mains and apparatus, motor drives, &c.; installation of four new Lancashire boilers; installation of new fuel economiser; brickwork settings for four boilers and economiser; installation of electric lighting, power and telephones at Caterham Mental Hospital. (February 24th.)

H.M. OFFICE OF WORKS.—March 14th. Electrical accessories. (See this issue.)

ST. MARYLEBONE.—March 19th. Board of Guardians. Automatic intercommunication telephones at the St. Marylebone Hospital. (See this issue.)

ISLINGTON.—March 13th. Board of Guardians. Six months' electrical supplies. Forms of tender from Mr. A. King, clerk, Guardians' offices, St. John's Road, Upper Holloway, N.

Maltby.—March 13th. West Riding Education Committee. Electric lighting installation, Special Subjects Centre, Maltby Hill Council school. Specifications from Education Department, County Hall, Wakefield.

Manchester.—March 19th. Electricity Committee. L.p. water pipework and supports, also dismantling of similar pipework at Stuart Street power station.

March 26th. L.p. water and oil pipework, &c., for auxiliary services (Section B), Barton power station. (See this issue.)

New Zealand.—WELLINGTON.—April 17th. Post and Telegraph Department. Head receivers. (B.X. 4239.)*

Oldham.—March 12th. Board of Guardians. Electric lamps and fittings for the Union Institution, Rochdale Road. Form of tender from Mr. F. W. Fletcher, clerk to the Guardians, Union Offices.

Portsmouth.—March 5th. Tramways Committee. Twelve months' supply of materials, including insulating materials, lamps, overhead line material, &c. (February 17th.)

Rhondda.—March 31st. Electricity Department. Twelve months' supply of meters, cables, joint boxes, compound, cut-outs, &c. (February 24th.)

Roxburgh.—March 7th. Education Authority. Electrical work at new offices, Newtown St. Boswells. Schedules, &c., from Executive Officer, Education Office, Newtown St. Boswells.

South Africa.—JOHANNESBURG.—April 5th. South African Railways and Harbours. Two electric goods lifts. (A.X. 5873.)*

March 15th. Telegraph material. (B.X. 4235.)*

Sunderland.—March 5th. Electricity Department. Two water-tube boilers with separators, mechanical stokers, economisers, chimneys, feed pumps, &c. General Manager, Electricity Offices, Dunning Street.

Uruguay.—MONTEVIDEO.—March 19th. State Electricity Works. Equipment for one main transformer station, five sub-transformer stations, two connection posts, and one inspection post, with accessories and spares. (B.X. 4173.)*

Warrington. — March 12th. Electricity Department. Motors and transformers. (February 24th.)

West Bromwich.—March 14th. Board of Guardians. Electric lighting installation at the medical officer's, &c., quarters at Hallam Hospital. Specifications (£2 2s.) from Mr. A. H. Ward, clerk, 22, Lombard Street, West Bromwich.

March 21st. Walsall and West Bromwich Unions Joint Committee. Cables in connection with building extensions at Great Barr Park Colony. (See this issue.)

Westhoughton (near Bolton). — March 9th. U.D.C. Electric metallic-filament lamps required during year ending March 31st, 1929. Form of tender from Mr. G. Hayes, surveyor.

*Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Contracts Closed.

Barnes.—Urban District Council. Accepted:—
First section of a main d.c. switchboard at the electricity works (£500, plus £21 for erecting).—Park Royal Engineering Co., Ltd.

Bexhill.—Electricity Committee. Accepted:—
Cable (£387).—Enfield Cable Works, Ltd.

Brighton.—Electricity Committee. Accepted:—
Laying e.h.p. cables in the centre of the town (£4,898).—Siemens Bros. & Co., Ltd.
Five pillars (£175).—W. T. Henley's Telegraph Works Co., Ltd.

Croydon.—Electricity Committee. Recommended:—
Two cooling towers (£5,509).—Film Cooling Towers, Ltd.
Grit-catching plant (£3,145).—Pneumatic Conveyance and Extraction Co., Ltd.

Dundee.—The Town Council on Thursday last week rejected offers by British cable manufacturers, amounting to £4,696, and accepted foreign tenders, which were over £1,000 cheaper. The convener of the Electricity Department said that the difference was so great that he could not pass over it, although they were concerned for British trade.

Hull.—Electricity Committee. Accepted:—
Boiler-house steel structure (£79,055).—Heenan & Froude, Ltd.
Five water-tube boilers and accessories (£168,279).—Clarke, Chapman & Co., Ltd.
Coal- and ash-handling plant (£20,192).—Spencer (Melksham), Ltd.

Irish Free State.—DUBLIN.—Department of Posts and Telegraphs.
Cable and poles.—F. Routledge.
Insulators.—Parvillee Frères & Co.
Telephones and protectors.—Phœnix Telephone & Electric Co., Ltd.
Wire (copper).—R. Johnson & Nephew, Ltd.; Aktiebolaget Svenska Metallverken.

Lamp Contracts.—The Southern Railway Co. has placed contracts for the supply of electric lamps with Edison Swan Electric Co., Ltd., the British Thomson-Houston Co., Ltd., and Metro-Vick Supplies, Ltd.

Leeds.—Electricity Committee. Recommended:—
Engine house equipment for the new generating station at Kirkstall; two 25,000-kW turbo-alternators (£176,504).—British Thomson-Houston Co., Ltd.

London.—HAMMERSMITH.—Electricity Committee.
Forty 5-point and twenty 6-point electric lighting installations in connection with the supply of electricity to flats on London County Council Wormholt housing estate:—

J. Vignon. (Recommended.)	**£267**
Crest Manufacturing Co.	277
A. E. Mayhew & Co.	278
Marryat & Place	296
O. E. Jones	300
C. J. Mount	302
J. R. Goode	304
G. Goodchild	312
A. Bantock	314
General Electrical Maintenance Co.	315
A. Higginbotham & Sons	320
Smith, Owen & Co.	320
Davis & Winch	328
"Rhymos"	352
"Helps Electric"	358
T. Clarke & Co., Ltd.	360
W. Griffiths & Co.	360
G. W. Franklin & Son	397
A. A. Camb	448
Stegman & Co.	471
Telephone & Electrical Maintenance Co. ...	576
Douglas Electrical Co.	600
Sydney Hellyar, Ltd.	616

ST. PANCRAS.—Stores and Contracts Committee. Recommended:—
Two e.h.p. switchgear panels (£675).—A. Reyrolle and Co., Ltd.

STEPNEY.—Electricity Supply Committee.
11,000 ft. galvanised welded conduit (£114).—Sloan Electrical Co., Ltd. (Accepted.)
1 ton tinman's solder and ¼ ton blowpipe solder (£380).—G. W. Neale, Ltd. (Accepted.)
50 tons pitch (£195).—Crow, Catchpole & Co., Ltd. (Accepted.)
Construction of wells, caissons in River Thames, circulating-water tubes, &c., at Limehouse generating station (£38,250).—Foundation Co., Ltd. (Recommended.)
Current limiters for 12 months (£958).—Electrical Utilities, Ltd.

Stockport.—The Council on Monday last resolved, by a majority of one, to accept the original Swiss tender of Escher, Wyss & Co., at £35,151, for a 20,000-kW turbo-alternator set.

Stoke-on-Trent.—Electricity Committee. Accepted:—
Sub-station transformers for 12 months.—Ferranti, Ltd.
Sub-station switchgear for 12 months.—Metropolitan-Vickers Electrical Co., Ltd.
Mains and cables for 12 months.—Callender's Cable and Construction Co., Ltd.

Whitehaven.—
Complete electrical installation, including passenger and goods hoist, at the new branch premises of the Cleator Moor Co-operative Society, Ltd.—T. S. Bell & Co. (Whitehaven).

The "Electrical Review" Service Department.

Inquiries must be accompanied by a stamped addressed envelope.

We should be glad to learn the names and addresses of makers of the following:—

Eagle blinkers (actual manufacturer wanted).

We also have an inquiry for firms who will weight and baize table standards.

Forthcoming Events.

Finsbury Technical College Old Students' Association.—Friday, March 2nd. Engineers' Club, W. Annual dinner.

Society of Engineers.—Monday, March 5th. Burlington House, W. 6 p.m. Registration of Engineers. Mr. R. Hazleton.

Association of Supervising Electrical Engineers.—Tuesday, March 6th. Junior Institution of Engineers. 7.15 p.m. "Electricity in Coal Mines." Mr. H. C. Ravenshaw.

Institution of Civil Engineers.—Wednesday, March 7th. Institution, St. George Street, S.W. 6 p.m. "The Effect of Load-factor on Works Costs in Electricity Generating Stations." Mr. J. M. Kennedy.

Institution of Electrical Engineers (Wireless Section).—Wednesday, March 7th. 6 p.m. "Some Practical Applications of Quartz Resonators." Messrs. G. W. Cobbold and A. E. Underdown.

(Irish Centre).—Thursday, March 8th. Trinity College, Dublin. 7.45 p.m. Faraday Lecture. "Electricity in the Service of Man." Dr. S. Z. de Ferranti, F.R.S.

(North Midland Centre). — Tuesday, March 6th. Hotel Metropole, Leeds. 7 p.m. "Modern Electric Wiring." Mr. D. S. Munro.

(North-Western Centre). — Tuesday, March 6th. Engineers' Club, Manchester. 7 p.m. "Storage Batteries in Relation to Modern Supply of Electric Lighting and Power." Mr. E. C. McKinnon.

(South Midland Centre).—Wednesday, March 7th. University, Birmingham. 7 p.m. "Modern Electric Wiring." Mr. D. S. Munro. "The Domestic Applications of Electricity." Messrs. A. J. Milne and R. H. Rawll.

Friday, March 9th. Chamber of Commerce, Birmingham. Joint meeting with the Institutions of Civil and Mechanical Engineers. "Engineering Works in India." Mr. F. Palmer.

(London Students' Section).—Tuesday. March 6th. Imperial Hotel, Russell Square, W.C. 7.30 p.m. Annual dinner.

(Scottish Students' Section).—Wednesday, March 7th. Royal Technical College, Glasgow. 7.30 p.m. "Electric Welding." Mr. P. N. R. Durand.

(North-Eastern Students' Section).—Saturday, March 2nd. Armstrong College, Newcastle-on-Tyne. 7.15 p.m. "A Stroll Among the Elements." Mr. C. Turnbull.

(North-Western Students' Section).—Monday, March 5th. Milton Hall, Manchester. 7 p.m. "Electrical Contracting." Mr. T. K. A. Douglas.

(Sheffield Sub-Centre). — Monday, March 5th. Mappin Hall, Sheffield. 7.30 p.m. Joint meeting of Kindred Societies. "Electricity in the Service of Man." Dr. S. Z. de Ferranti, F.R.S.

(Dundee Sub-Centre).—Thursday, March 8th. University College, Dundee. 7.30 p.m. Ordinary meeting.

(Tees-side Sub-Centre).—Wednesday, March 7th. Cleveland Technical Institute, Middlesbrough. 7 p.m. "Electric Welding." Mr. D. T. Smout.

Royal Institution of Great Britain.—Thursday, March 8th. 21, Albemarle Street, W. 5.15 p.m. "Optics and Chemistry." Dr. J. J. Fox.

Saturday, March 10th. 3 p.m. "The Transformation of Matter." Sir Ernest Rutherford, F.R.S.

Monday, March 5th, and Wednesday, March 7th. 5.15 p.m. "Wave Mechanics." Dr. E. Schrödinger.

Electrical Power Engineers' Association (Manchester Section).—Thursday, March 8th. Geographical Hall, Manchester. 7.45 p.m. "Super Tension Transmission (by Underground Cables)." Mr. A. J. Shrystall.

(National Technical Groups, London Section).—Tuesday, March 6th. Engineers' Club, W. 7.15 p.m. "The Problem of the Super-Volt Cable." Mr. N. A. Allen.

Physical Society.—Friday, March 9th. Imperial College of Science, London, S.W. 5 p.m. Ordinary meeting.

North-East Coast Institution of Engineers and Shipbuilders.—Friday, March 9th. Mining Institute, Newcastle-on-Tyne. 6 p.m. "Measurement of Power." Mr. J. S. Brown.

Association of Mining Electrical Engineers (South Wales Branch).—Saturday, March 10th. Cox's Café, Cardiff. Annual dinner.

Notes.

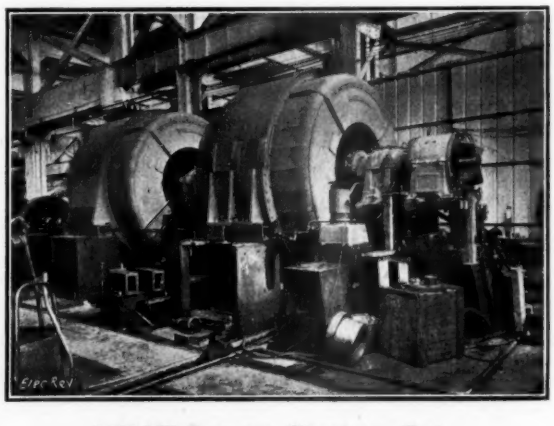
Electricity Supply in London.

As the result of complaints received from various metropolitan borough councils, especially Wandsworth, Camberwell, and Finsbury, the London and Home Counties Joint Electricity Authority states that the tariffs in force in October last show "wide differences in charges for like supplies, which may or may not be justified by local conditions." In these circumstances it thinks the suggestion justified that a comprehensive investigation should be made into the whole subject. Accordingly the Authority recommends "that a statement regarding the communications received by the Authority be forwarded to the Electricity Commissioners, and that it is suggested to the Commissioners that an inquiry should be held by them into the whole question of charges made in the London and Home Counties electricity district for the various supplies of electricity."

The subject was raised at a meeting of the London County Council last week; Mr. Angus Scott inquired if the attention of the Council's Special Committee on Electricity had been directed to the official election manifesto of the Labour Party, in which it was stated that "The Municipal Reformers have entered into a shameful deal with the London electricity companies whereby these concerns—organised for profit and not for service—have been able to fasten their teeth into millions of London electricity consumers." Mr. E. M. Dence, the chairman of the Special Committee, replied that he had seen the manifesto; its writer had been misinformed. Under the new Act the dividends of companies were regulated under the sliding-scale system; the companies supplied electricity to huge industrial concerns and to the people generally, and for services of such magnitude were entitled to a reasonable profit. Mr. J. E. Mark sought information as to the powers, if any, possessed by the L.C.C. to control the charges of private electricity companies. The answer, also by Mr. Dence, was that under the new scheme of the sliding scale it was to the advantage of the companies to reduce prices. The lower the charges the higher could be their dividends. The L.C.C. had no powers over the prices, but could make representations on the subject to the Ministry of Transport.

A Large Frequency-Changer Set.

There is now being installed in the Stourport power station of the Shropshire, Worcestershire, and Staffordshire Electric Power Company, a 5,000-kW frequency-changer set made by



5,000-kW Frequency-Changer on Test.

the British Thomson-Houston Co., Ltd. The method adopted for the transport of this large machine from the manufacturers' works involved the utilisation of both rail and road; the two rotors, weighing respectively 18 and 21 tons, were taken from Rugby to the power station by means of a Scammel lorry, while the two stator frames, 21 and 23 tons, were put on the rail on a crocodile truck. At Stourport they were lifted from the trucks by the railway company's breakdown crane, and taken to the site by a traction engine. The overall measurements of the stator units are 17 ft. 6 in. by 7 ft. 3 in. by 11 ft. 1 in., and 17 ft. 6 in. by 6 ft. 6 in. by 11 ft. 1 in. The stator frames are built up of steel plate. The accompanying illustration shows the complete set on test in the B.T.-H. works. The machine consists of a 6-pole, 25-cycle, 11,000-V, 6,050-kVA, three-phase synchronous motor, 500 r.p.m., and a 12-pole, 50-cycle, 11,500-V, 7,500-kVA, three-phase alternator. The alternator stator is carried in a cradle provided with motor-operated gearing, so that it can be rocked 12 deg. on either side of the mean position for the purposes of synchronising and load sharing. The rocking gear is operated by a squirrel-cage induction motor having two windings, so that it can be run off a 50-cycle as well as the 25-cycle supply. Each of the synchronous machines has its own exciter, the armatures being overhung on the main shaft extensions. Starting is effected by means of an oil-immersed self-cooled auto-transformer of the outdoor type.

Appointments Vacant.

Electrical, boiler and factories' inspector for the Baluchistan Public Works Department. Electrical wireman (£400) for the Public Works Department of the Government of Sierra Leone. Assistant engineer and manager for the Wessex Electricity Co. Assistant consumers' adviser and canvasser (£250) for the St. Pancras Borough Council Electricity Department. (See our advertisement pages to-day.)

Popular Science Talks.

A series of Friday popular talks on science and invention, arranged by King Edward's Hospital Fund for London, will be given during March, on March 9th, 23rd and 30th, at the Polytechnic, Regent Street, at 5.30 p.m. The second lecture will be given by Mr. T. L. Eckersley, B.A., on "Beam Wireless, with Experiments and Demonstrations." Tickets (2s. 6d. and 5s.) for each lecture, may be obtained from King Edward's Hospital Fund for London, 7, Walbrook, E.C.4, the Polytechnic, or the usual agencies, without booking fee.

X-rays for Examining Coal.

"The X-Ray Examination of Coal Sections" was the subject of a paper by Mr. C .Norman Kemp, B.Sc., at a meeting of the Royal Society of Edinburgh. He explained that coal was particularly suited to radiographic examination as a consequence of its mode of origin and structural characteristics on the one hand, and of the nature of X-rays on the other. The paper dealt with certain results obtained in the course of a more extensive study of the subject undertaken by the author on behalf of the Fuel Research Board.

An "Indirect" Supply.

The electricity supply in some districts of Dundee has recently been changed from d.c. to a.c. A correspondent of the *Dundee Evening Telegraph*, who had been complaining of the poor quality of the electric light in the west end of the city, writes:—"I think it only fair to tell you that within the last week or two there has been a great improvement. A new system has apparently been introduced, at least I have got a new meter. I am told that the current does not now come *direct* to the user—one thing I am glad of, come from where it may, the illuminant has now greatly improved."

A New Aluminium Alloy.

Under the name "Aldrey," the Aluminium Industrie Gesellschaft, of Neuhausen, Switzerland, has recently brought out a new aluminium-alloy wire, which, while having the same specific gravity as pure aluminium and only 8 per cent. less electrical conductivity, has a "resistance to flexure" 80 per cent. higher than that of wire made of the pure metal. The new alloy is stated to consist of aluminium with an admixture of 0.6 per cent. of silicon, 0.3 per cent. of iron, and 0.4 of magnesium.

Mexican Tariff Amendments.

Among the goods affected by the alterations in the Mexican Customs tariff put into force recently are "Slabs of steatite, marble, slate, or other similar materials for electrical apparatus." The new rates are: Net weight up to 75 kg., 0.15 peso per kg.; over 75 kg., 0.02 peso per kg.

Prospecting by Electricity.

By means of a Swedish electrical prospecting method, large and valuable ore deposits have been located in Newfoundland, according to announcements made by Hans Lundberg, a Swedish engineer and the inventor of the method. It is said that rich copper, zinc and arsenic-lead finds were recently made in the province of Vesterbotten, in Sweden, by this means. The latest success reported is the finding of a deposit of approximately 3,000,000 tons of ore, containing 17 per cent. of zinc, 7 per cent. of lead, and 2 per cent. of copper, near the Old Buchans Mine in Newfoundland, on territory belonging to three large mining concerns. The deposit is covered by 30 to 60 feet of boulders, but tests made by means of diamond drilling have shown that the new find is likely to prove very profitable.

Traffic Signs and Signals.

In opening the discussion on the above subject at a meeting of the Institution of Public Lighting Engineers on February 21st last, Mr. W. J. Jones, assistant manager of the E.L.M.A. Lighting Service Bureau, said that the authority for setting up sign or direction posts was derived from Section 24 of the Highway Act, 1835, which empowered highway authorities throughout the country in such a way that the whole matter was in their control. The chief credit, however, for the introduction of such signs was largely due to the very active pioneer work of the Automobile Association. This Association had obtained permission for the erection of traffic signs and for their maintenance, while the R.A.C. was responsible for much other good work in the same direction. In the same way that street lighting could no longer be considered a parochial affair, it appeared that the general question of traffic signs and signals required much wider consideration than was ordinarily given it. In 1921, it was reported in a circular letter from the Ministry of Transport that, although the recommendations of the Local Government Board of 1904 were extensively adopted, there existed a great variety of other signs and directions, both official and unofficial, and these had been placed on the sides of highways and created confusion and a tendency among road users to disregard them. He suggested that the whole question of installation and general maintenance of traffic signs and signals should come under the purview of the public lighting engineer, working, of course, in conjunction with the appropriate traffic authorities or committees. Once it had been decided that a sign should be installed, then the public lighting engineer should be responsible in every other direction, both to ensure that the sign met the requirements, and that it was properly maintained. The public lighting engineer was peculiarly fitted to undertake this duty apart from staff considerations, since he had an intimate knowledge of the general visibility requirements on streets, and could consider the matter from a technical point of view.

Educational.

The Board of Education is making arrangements for short courses to be held in the summer for teachers in recognised technical schools, &c., including engineering science and electrical engineering at Oxford. Teachers who desire to attend the courses must make application to the Board of Education on Form 106e. U. as soon as possible, and in any case before April 14th, 1928. The number of teachers who can be admitted to each course is limited. A teacher selected to attend one of the courses will receive free instruction and will be repaid his travelling expenses. The engineering courses will be held at Oriel College, Oxford, from July 21st to August 1st. Members of the courses will reside in the college, the inclusive charge being 10s. per day.

B.E.S.A. Publications.

The British Engineering Standards Association has recently issued a British standard specification (No. 324-1928) for translucent glassware illumination fittings for interior lighting. "Translucent glassware" is given as including only satin-finished, frosted, sprayed-enamel, opal, and flashed-opal glass, and glass having a milky texture, and no form of decorative glassware. After specifying the general conditions of the glassware and requiring the type, maximum rating and position of the light source to be clearly stated by the manufacturer, a table of the neck dimensions of totally enclosed and bowl fittings and metal work, for both electric and gas lighting, is given. In order to safeguard against the likelihood of cracking or deterioration due to overheating, a heat-resistance test has been included, and it is also required that electric light fittings shall be so designed that the internal leads do not become heated to such an extent as to cause any dangerous effects. The diffusing power, brightness and performance of the fitting are also dealt with, and a testing clause covers the selection and testing, whilst the two appendices give respectively methods of flux and brightness measurement.

Another B.S.S. recently issued by the Association is No. 162-192 for electric power switchboards for indoor installations up to and including 33,000 volts. This relates to switchboards for use with low, medium, high and extra-high voltages, both for d.c. circuits and a.c. circuits for frequencies up to and including 100 cycles per second. The general clauses include definitions and details of design and construction which are common to switchboards for all voltages. These clauses provide for arrangement of bus-bars, connections, and wiring, interchangeability between component parts of similar design and rating, protection of operators, protection against fire, provision of safety devices, interlocks, indicating devices, and colouring of signal lamps, remote control, and so on. Further sections deal with the requirements, additional to those in the general clauses, for low- and medium-voltage and high- and extra-high-voltage installations, respectively, the latter comprising both cellular and metal-enclosed types. The final section deals with the high-voltage test to be carried out on the completed switchboard. There are two appendices, one indicating the information which should be supplied with the inquiry or order, and the other dealing with recommended slab sizes for slate and marble slabs.

The above specifications may be obtained from the Publications Department, British Engineering Standards Association, 28, Victoria Street, S.W.1, price 2s. 2d. each, post free.

R.A.F. Reserve Openings.

The Air Ministry announces that a number of openings present themselves now to young men to be trained as pilots in the Air Force Reserve. Applicants must be of good education and physique, but need not have had any previous flying experience. They must be over 18 and under 25 years of age. Commissions are granted in the first place for five years, but at the end of this period extension may be allowed at the discretion of the Air Council, for further periods each of not more than five years. Application forms and further details can be obtained by applying to the Secretary (S.7.c.), Air Ministry, Adastral House, Kingsway, London, W.C.2.

A Hawksbee Lecture.

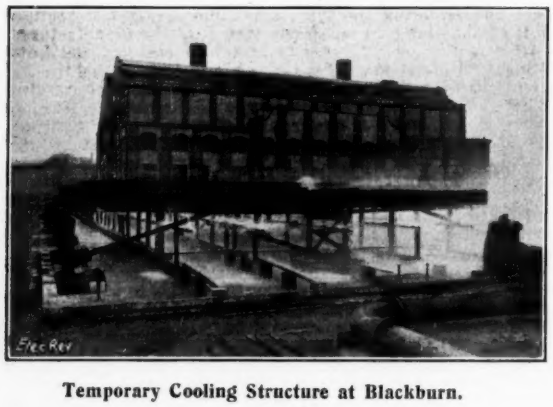
Prof. E. N. da C. Andrade, D.Sc., of the Artillery College, Woolwich, gave an unusual and interesting lecture on February 22nd, under the auspices of the Royal Philosophical Society of Glasgow. He repeated the early experiments of Hawksbee, using an exact replica of the machine invented by the pioneer, and also showed many examples of electrical discharges in evacuated tubes. The lecturer and his assistant appeared in the costume of 1709, and endeavoured to adumbrate the early period in language and manner.

The All-Electric Office.

On February 22nd members of the Office Machinery Users' Association met at the London School of Economics to discuss the advantages of the "all-electric office." A paper was presented by Mr. R. Borlase Matthews, Wh.Ex., a member of the Council of the Association, who pointed out that the possibilities of electricity in a business office were almost unlimited. Office lighting, when handled in the modern way, was quite different from the lighting of a drawing room, for an almost shadowless light illuminating every part regardless of desk positions was now available. The lecturer mentioned that already there were forty-one different uses to which electricity could be put in an office and, to his knowledge, there were at least 150 different types of machines now on the market, varying in kind from dictating machines to pencil sharpeners, and embracing a wide range of apparatus for the use of the manager, accountant, secretary, typist, and office boy. The running costs were negligible, and the installation costs were compensated for by increased efficiency, less fatigue, and the speed with which it was possible to tackle work. Motor-driven typewriters were rapidly appearing in up-to-date offices, where electrically driven accounting and book-keeping machines were proving their worth. Among the lesser known uses to which electricity could be put in an office were the reflex copying of business papers (which would copy documents even when written or printed on both sides), the working of a small kinematograph apparatus in the interests of the publicity department, and the towel-less drying of the hands after washing.

Temporary Water-Cooling at Blackburn.

Following the damage done to the cooling towers of the Blackburn electricity undertaking by the gale in October last, Electrical Review, November 4th, p. 781, temporary cooling-water arrangements were at once put in hand, and have since been in continuous use. Timber was available in considerable



Temporary Cooling Structure at Blackburn.

quantities after the demolition of the towers, so that temporary troughing, &c., could be erected over the two spare ponds which were available. Greater loads than were ever carried on the original towers have been dealt with by the temporary structures, but, of course, the efficiency of generation has naturally been lower. The wrecking of the cooling towers necessitated the use of much greater quantities of canal water, and this providentially allowed the department to carry its normal loads without the consumers having any knowledge whatever of the serious difficulties with which the department was faced. The weather conditions, fortunately, have been very kind, as frost and dry cold have helped very considerably to keep the working costs low under the abnormal conditions. Very interesting evidence as to the strength of the gale was discovered when the debris was being removed, in that the wrought-iron straps, 4 in. wide by ⅝ in. thick, which had held the main masts of the towers on to the foundation bolts, were found to have been pulled apart without being bent or distorted in any way. The accompanying illustration shows the provisional arrangements over one of the ponds.

Society of Technical Engineers.

A recent extension of the scope of the above Society includes co-operation with the British Engineering Standards Association in an effort to reduce the number of sizes of the various articles, such as bolts, commonly used in the engineering trades. Before this work had been carried very far, the necessity arose for an accurate system of classification, and the Society accordingly invited Mr. R. Borlase Matthews to present to its members a paper on the general subject of "Decimal classification as an aid to the engineer." This was done at the Engineers' Club, London, on February 15th. The speaker pointed out that one of the important features of decimal classification was that the data on any subject automatically grouped themselves together, so that the search for information was materially assisted. A further advantage was that the classification and index were in existence long before it was known what data were to be filed.

Institution Notes.

Institution of Electrical Engineers.

Informal Meeting.—An interesting discussion on "Boiler Plant" was opened by Mr. L. M. Jockel before an informal meeting on Monday, February 20th, when Mr. J. F. Shipley was in the chair. Mr. Jockel said the developments in the past few years had been so rapid and extensive that it was difficult to keep up with them and to foretell the lines improvements would take in the future. He showed a number of lantern slides illustrating some of the big Home and foreign plants at work and in course of erection, the salient points of which he briefly described. Tables of capacities and efficiencies of various types of plants installed in the different capital stations, with few exceptions, showed remarkably approximate results. The high-pressure problem, he said, was mainly a matter of strength of the boiler metals. With extra-high pressures the elastic limits of steel decreased very rapidly under the increased temperature. Mr. Jockel indicated the methods of dealing with the difficulty, and thought alloy-steel boilers were unlikely to become an economic possibility owing to the high cost, while for the same reason the forged steel drum was almost prohibitive. Welded drums were produced in some number by Krupps, but there was little experience of them in this country. He thought that in considering future developments much more consideration would be given to increased combustion by super-oxygenation.

London Programme.—Owing to illness, Mr. F. H. Rosencrants will not be able to read his paper on March 15th; Mr. W. T. Townend's paper on "Economics of Electric Power Production" will be read on that date, and the former will be read on May 3rd.

Mersey and North Wales (Liverpool) Centre.—Dr. S. Z. de Ferranti, F.R.S., M.I.E.E., delivered the Faraday Lecture of the Institution at Liverpool University recently. The lecture was open to the public, and there was a very large attendance. Lord Cozens-Hardy, D.L., M.I.E.E., presided. The subject was "Electricity in the Service of Man." Dr. Ferranti made particular reference to the use of electricity in the home, in which connection very great developments were to be anticipated. The future was also full of promise for electro-farming. The one blot on the outlook was the problem of storage. It was too expensive to store electricity on a large scale, but its product, low-grade heat, could be conserved in the form of hot water. Some means should be found for the storage of electricity in a more economical and available form, allowing for its conversion back to electricity. He did not see how this could be achieved, but when it was possible to carry electricity equivalent to the same weight of coal or oil for an equal amount of power, some wonderful results would be obtained. The future for electricity was bright with promise. He believed that the main railway lines would be electrified to the same extent as the suburban lines. The efficiency of the central stations of to-day might be taken to approximate to 25 per cent. What was wanted was the marvellous efficiency of electricity in its application. It could be said that if a thing could be done electrically it could be done better by that means than by any other.

Junior Institution of Engineers.

On Friday last Mr. C. H. Faris gave a lecture on the "Electrochemical Deposition of Metals." He said that electrochemically deposited metal coatings were now extensively used in engineering work for effecting repairs and renovations as well as for the provision of non-corroding surfaces. The metal generally used for coating purposes was nickel, and the amalgamation of the nickel with the metal on which it was deposited, whether steel, cast iron, or aluminium, was very strong; in tensile tests the steel failed before the nickel-steel bond, and in the course of wear the nickel coating never lifted, even at feather edges. Nickel, being a very tough metal, provided a good surface for bearings, sleeves, axles, valve parts and the like, although it could not compare with case-hardened steel for heavy duty. The machining of work after deposition of nickel presented no unusual difficulties, but wherever possible grinding was resorted to. No machining was required before treatment, electrolytic cleaning processes being used. Nickel coating to prevent corrosion had been used successfully on turbine parts, condenser tubes, and propeller shafts.

Diesel Engine Users' Association.

At the meeting of the Association on February 24th, the report of the Committee on Heavy-oil Engine Working Costs for the year 1926-27, was presented and discussed. The present report forms the sixth of a series which have been issued by the Association annually. A table accompanying the report contains particulars of the working costs of 41 heavy-oil engine stations in the United Kingdom and twelve overseas. The average total engine cost of the 41 home stations, with a total output of about 44,000,000 kWh and an average annual plant load factor of 14.7 per cent., was 0.713d. per unit generated, which compares favourably with the corresponding figure of 0.799d. for the previous year. The reduction in the average engine cost is due partly to the lower average fuel prices and partly to the increased capacity and output of the stations. The total engine cost for the oversea stations, with an output of over 30,000,000 kWh and an average annual plant load factor of 20.7 per cent., is 0.65d. per unit gener-

ated. The outputs of some of the stations referred to in the table have been reduced owing to supplies of electricity having been purchased in bulk, and useful information is afforded as to the probable saving which can be effected in such cases by the use of heavy-oil engine plant for peak-load purposes. As instancing the well-maintained efficiency of the heavy-oil engine after heavy and continuous service, the case is quoted of an 80-b.h.p. engine, 21 years old, which, during the period covered by the report, ran for 4,704 hours with an average fuel consumption of 0.73 lb. per unit generated. Of the new plant installed during the year, three of the engines were of upwards of 1,000 b.h.p., and eight others ranged from 500 to 750 b.h.p. Copies of the report containing an account of the discussion will shortly be obtainable at a price of 5s. per copy from the joint honorary secretaries.

Institute of Transport.

At the meeting on March 5th, in place of Sir Samuel Hoare, Air Vice-Marshal Sir W. Sefton Brancker, K.C.B., Director of Civil Aviation, will deliver an address entitled "Progress in Air Transport."

A largely-attended meeting was held at Edinburgh on February 14th to inaugurate the Scottish Section of the Institute. The president (Mr. Roger T. Smith) delivered an address, in which he outlined the activities of the Institute and related the circumstances which led to the formation of the Scottish Section. Meetings will be held alternately at Edinburgh, Glasgow, and in other parts of Scotland. The chairman is Mr. A. H. Roberts, O.B.E., superintendent and engineer, Leith Docks and Harbour, and the secretary Mr. R. Stuart Pilcher, manager of the Edinburgh Corporation Tramways.

Royal Institution.

On Monday next (March 5th), at 5.15 p.m., Professor E. Schrödinger will commence a course of four lectures in English at the Royal Institution on "Wave Mechanics"; on Thursday, March 8th, Dr. J. J. Fox gives the first of two lectures on "Optics and Chemistry"; and on Saturday, March 10th, at 3 o'clock, Sir Ernest Rutherford begins a course of four lectures on the "Transformation of Matter." The Friday evening discourse on March 16th will be delivered by Prof. E. T. Whittaker on the "Quantum and Relativity Theories of Light."

Our Personal Column.

Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements.

The highest award of the Institution of Mechanical Engineers—the Thomas Hawksley Gold Medal—has been awarded to Mr. H. L. GUY for his paper entitled "The Economic Value of Increased Steam Pressure," which was presented in November, 1926. The paper sets out clearly the data necessary to determine the most economical pressure for any given set of conditions, and we judged it of so much importance that we reproduced it almost in full (ELEC. REV., April 29th, 1927, p. 697). Mr. Guy, who is a graduate of the Cardiff University College, has been for some years chief engineer of the mechanical department of the Metropolitan-Vickers Electrical Co., Ltd., and has been responsible for many important developments in steam turbine practice.

A new statute enables the Senate of the University of London to confer the title of "Honorary Fellow" of University College, London, on former students of the college whose academic careers in the University were specially distinguished, or who have subsequently attained distinction in art, literature, science, or public life. Amongst the first Honorary Fellows to be elected are Dr. S. Z. DE FERRANTI, F.R.S., past-president I.E.E.; Mr. A. C. G. EGERTON, F.R.S., Reader in Thermodynamics in the University of Oxford; and Mr. ROGER T. SMITH, past president I.E.E.

The Huddersfield Town Council has increased the salary of the borough electrical engineer, Mr. J. W. TURNER, from £900 to £1,000 per annum; that of the deputy electrical engineer, Mr. E. LUNN, from £594 to £625; and that of the tramway manager, Mr. A. A. BLACKBURN, from £850 to £900.

Mr. G. STANLEY AMBROSE has proceeded to India to take charge of the Cawnpore branch of the British Thomson-Houston Co., Ltd.

The Birmingham Tramways and Omnibuses Committee recommends the appointment of Mr. ARTHUR CHANTREY BAKER as general manager of the Tramways and Omnibus Department, in succession to his father, Mr. Alfred Baker, who is due to retire in August. Mr. Arthur Baker is at present chief engineer, a position he has held since 1920. He entered the service of the Corporation in 1908, as assistant engineer. Last year he was awarded the first prize, offered by the Municipal Tramways Association, of which he is a member, for an essay on tramway engineering. He is also a member of the Tramways and Light Railways Association, and the Joint Committee on the Improvement of Tramways Rolling Stock. He is 40 years of age, and during the war attained the rank of major in the R.A.F. In the local world of sport he is a well-known figure. Mr. Alfred Baker, who recently recovered from a severe illness, will assist the department in an advisory capacity until March 1st, when his son will take up his new duties.

We are pleased to be able to report that Mr. P. F. ROWELL, secretary I.E.E., continues to make good progress towards recovery from his severe illness.

Both the Scarborough and the Lancaster Councils have decided to pay their chief electrical engineers in accordance with the A.M.E.E. minimum salary scale.

Lt.-Col. C. HARDIE, D.S.O., M.I.E.E., has been appointed general manager of the Chelmsford works of Crompton-Parkinson, Ltd.

Mr. S. L. MCFARLANE, of Kingstown, has been appointed extension engineer, Dublin Corporation Electricity Department, for a period of one year, at a salary of £42 per month. Mr. D. D. HUSSEY, assistant private works department, Electricity Section (salary £165 per annum) has been placed on the £245-£295 salary scale. Mr. EDWARD COX, temporary switchboard attendant, has been placed on the permanent staff, at a salary of £245, plus 5 per cent.

Mr. JOSEPH BOYCE, the borough electrical engineer at Morecambe, has tendered his resignation, he having been appointed to a similar post at Cleethorpes. In accepting the resignation the Council accorded its best wishes to Mr. Boyce for his future health and success.

At a meeting of Glasgow Corporation Electricity Committee on Friday last a letter was submitted from Mr. R. B. MACCALL, intimating his resignation from the position of secretary and treasurer of the Electricity Department as from March 31st. The Committee expressed a desire that Mr. Maccall should continue to discharge the duties of his office till May 31st, the end of the Corporation financial year. Mr. Maccall has been 54 years in the service of the Corporation.

Mr. G. A. GREENWOOD, for many years technical representative in Brazil for Messrs. J. Stone & Co., Ltd., has arrived in England. Letters should be addressed: c/o The Lancashire and Yorkshire Bank, Ltd., Blackpool.

Mr. V. F. BUSH, of the Shropshire, Worcestershire and Staffordshire Electric Power Co., was recently presented by his colleagues with a desk clock and other useful gifts upon his departure from Redditch to become resident engineer at the Smethwick power station.

The chairman, managing directors, and staff of Messrs. Drake & Gorham, Ltd., recently presented an inscribed gold watch to Mr. H. C. J. FOX, who has been works manager for the past 22 years. Mr. Fox is taking up the duties of general manager of the Astral Engineering Co., Ponders End. The company is erecting a new factory.

Sir OLIVER LODGE is to be the principal guest at the annual dinner of the North Staffordshire Chamber of Commerce on March 14th. He has been asked to accept the freedom of his native city, Stoke-on-Trent, upon the occasion of his visit.

The marriage has taken place of Mr. H. WILLOTT TAYLOR, assistant organiser for Messrs. Edwards & Armstrong, electrical engineers, of Cainscross, Glos., and Miss B. M. BROWN, of Rodbrough Common.

Mr. S. G. HARMER has been presented by the staff of the Western Union Telegraph Company at Penzance, where he has served for seventeen years, with a travelling suitcase upon his promotion to take charge of the company's interests at Southampton.

Obituary.—MR. A. L. ORMROD.—The death occurred in London, on February 24th, of Mr. Alexander Lawson Ormrod, for 30 years a member of the Manchester Stock Exchange. He had been a director of many important companies, including W. T. Glover & Co., Ltd.

Financial Section.

New Companies, Returns of Share Capital, Debenture Changes, Reports of Electrical Companies, Dividend Results, Transactions in Stocks and Shares.

New Companies Registered.

W. S. Wilton & Co., Ltd.—Private company. Registered February 22nd. Capital, £2,000 in 1,500 ordinary and 500 7 per cent. cumulative preference shares of £1 each. Objects: To carry on the business of electricians, manufacturers, and sellers of and dealers in and agents for all kinds of electric lamps, heating and cooking apparatus, wireless apparatus, &c., and to acquire the business carried on at 56, Bromham Road, Bedford, as W. S. Wilton & Co. The first directors (to number not fewer than two or more than five) are: S. E. Watkis, "Yaxley," Bromham Road, Bedford, electrical engineer; G. Byfield, 32, Lushington Road, Willesden, N.W.10, certified accountant and incorporated secretary (both permanent, subject to holding £250 shares each). Registered office: 56, Bromham Road, Bedford.

Aeonic Wireless, Ltd.—Private company. Registered February 22nd. Capital, £1,000 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in wireless receivers and instruments, drawn wire electric cabling, electric lamps, and all parts and accessories used in connection with electrical, telegraphic, telephonic, and wireless instruments, &c. The subscribers (each with one share) are: Kathleen Hosler, "Shirley," Montague Road, Richmond, Surrey; Mary Greig, "Freshfield," Poplar Walk, Herne Hill, S.E.24, secretary. Registered office: 32-36, Coventry House, South Place, E.C.2.

H. W. Herbert, Ltd.—Private company. Registered February 23rd. Capital, £8,000 in £1 shares. Objects: To acquire the business of H. W. Herbert, chemist and druggist and manufacturer and retailer of electrical apparatus now carried on at Egham, Englefield Green, Ashford (Middlesex), and Bracknell. The first directors are: E. S. Herbert, Alder House, Aldersgate Street, E.C.1, solicitor; N. Bamforth, Beestones, Virginia Water; W. Wood, St. Olaves, Chaucer Road, Ashford, Middlesex; H. W. Herbert (permanent), Park End, Egham, Surrey. Registered office: 41, High Street, Egham, Surrey.

Broughton Copper Works (1928), Ltd.—Public company. Registered on February 20th, with a nominal capital of £525,000 in 425,000 7½ per cent. cumulative preference shares of £1 each and 2,000,000 ordinary shares of 1s. each. The objects are: To acquire the business, undertaking, and goodwill of the Broughton Copper Co., Ltd., and of John Bibby, Sons & Co. (Garston), Ltd., copper smelters and manufacturers, to adopt an agreement with the Broughton Copper Co., Ltd., and to carry on the business of manufacturers, producers, smelters, refiners, manipulators, workers, shippers, importers and exporters of and dealers in copper, copper ore, and other metals, ores and minerals, chemical manufacturers, mechanical and electrical engineers, &c. The consideration payable to the vendors is £588,750, to be satisfied as to £552,500 in cash and as to the balance by the allotment to the vendor or its nominees of 725,000 ordinary shares credited as fully paid up. The minimum cash subscription is 7 shares of any denomination. The first directors are:—L. Sumner, Butt Hill, Prestwich (chairman and managing director); G. Fitzbrown, Ditton Copper Works, Widnes (managing smelter works); J. H. Bibby, Garston (managing plate and sheet rolling mills); E. C. Clark, Palace Hotel, Southport (managing foreign sales department); F. Tomlinson, South Holme, Bowdon (managing Broughton Works); E. A. Mercer, 5, Albert Road, Cheadle Hulme (managing sales department); D. H. Siltzer, 6, Broad Street Place, E.C.2 (managing London office). The said directors are all directors of the above-mentioned companies. Qualification: £500 shares or stock. Remuneration: £1,500 per annum, divided between them. Secretary: W. B. Albury, A.C.I.S. Office: Broughton Copper Works, Manchester.

West Hampshire Electricity Co., Ltd.—Public company. Registered February 18th, with a nominal capital of £30,000 in £1 shares. The objects are to carry on the business of an electric light and power company in all its branches. Minimum cash subscription, 7 shares. The subscribers (each with one share) are:—W. H. Walford, 10, Lambourne Road, Leytonstone, E.11, solicitor's clerk; W. J. Yeoman, 244, Lordship Lane, East Dulwich, S.E.22, solicitor's clerk; and five others. Qualification: £250 shares. Solicitors: Ashurst, Morris, Crisp and Co., 17, Throgmorton Avenue, E.C.2.

Zone Wireless Co., Ltd.—Private company. Registered February 10th. Capital, £50 in 1s. shares. Objects: To acquire the business of a wireless appliance manufacturer carried on by D. D. Pyper, at 167, Oxford Street, W.1, as the Zone Wireless Company. The subscribers (each with one share) are:—J. Q. Shirrepp, Iddesleigh House, Caxton Street, S.W.1, C.A.; Margaret E. Maddison, 5, Draycott Avenue, Chelsea, S.W.3, secretary. The subscribers are to appoint D. D. Pyper, of Poland House, W.1, managing director for five years, at a yearly allowance of £500 for travelling and incidental expenses. Registered office: Iddesleigh House, Caxton Street, S.W.1.

Clark & Moir, Ltd.—Private company. Registered February 18th. Capital, £3,000 in £1 shares. Objects: To acquire the business of wholesale wireless factors and importers carried on by J. S. Clark at 147-9, Newington Causeway, S.E., as "J. Francis." The permanent directors are:—J. S. Clark, 47, Barry Road, S.E.22; A. W. Moir, 4, Park Farm Road, Kingston-on-Thames. Qualification: £100. Secretary: J. S. S. Clark. Registered office: 147-9, Newington Causeway, S.E.

E. T. Roberts, Ltd.—Private company. Registered February 20th. Capital, £3,000 in £1 shares. Objects: To acquire the business of a wireless agent and radio accessories and gramophone dealer now carried on by E. T. Roberts at Botchergate, Carlisle, as "E. T. Roberts." Permanent directors: E. T. Roberts (chairman and managing director), 8, St. Aidan's Road, Carlisle; E. S. Roberts, 8, St. Aidan's Road, Carlisle; W. Auckland, 274, Warwick Road, Carlisle. Qualification: £100 shares. Solicitor: A. T. Saul, 29, Fisher Street, Carlisle.

Official Returns of Electrical Companies.

Siemens Bros. & Co., Ltd.—Satisfaction to the extent of £31,900 on January 2nd, 1928, of trust deed dated January 15th, 1918, securing £1,330,000 debenture stock.

General Radio Co., Ltd.—F. S. Fisher, C.A., of 329, High Holborn, W.C.1, was appointed receiver and manager by order of court dated February 16th, 1928.

N.S. Battery and Equipment Co., Ltd.—P. B. Nevill, of 94, Old Broad Street, E.C., ceased to act as receiver and manager on January 18th, 1928.

Commercial Telephone and Electrical Co., Ltd.—J. H. Rook, solicitor, of 22, Southampton Street, Holborn, W.C., was appointed receiver on February 10th, 1928, under powers contained in debentures dated April 30th, 1924.

Rotax (Motor Accessories), Ltd.—Capital, £506,500 in 253,250 preference and 253,250 ordinary shares of £1 each. Return dated July 1st, 1927 (filed January 5th, 1928). 253,034 preference and 253,250 ordinary shares taken up. £168,867 paid on 75,000 preference and £93,867 ordinary shares, £337,417 considered as paid on the remainder. Mortgages and charges, nil.

Yorkshire Electric Transformer Co., Ltd.—Capital, £5,000 in £1 shares. Return dated December 31st, 1926. 3,530 shares taken up, £3,530 paid. Mortages and charges, nil. Return of allotments, made up to September 20th, 1927, shows a further 500 shares allotted payable in cash and fully called up.

Kent Bros. Electric Wire Co. & E. H. Phillips, Ltd.—Capital, £15,000 in £1 shares. Return dated December 31st, 1927. 11,500 shares taken up. £11,500 paid. Mortgages and charges, £19,500.

East Suffolk Electricity Distribution Co., Ltd.—Debenture dated February 6th, 1928, to secure £20,000, charged on the company's undertaking and property, present and future, including uncalled capital. Holder: H.M. Treasury Solicitor, Whitehall, S.W. (The company covenants not to create any mortgage or charge on the property or assets *pari passu* with or in priority to the above.)

Edison Swan Cables, Ltd.—Satisfaction in full on February 9th, 1928, of debenture dated July 6th, 1926, securing £7,500.

City Notes.

Yorkshire Electric Power Co., Ltd.

This company's report for 1927 was reviewed in our issue of February 10th (p. 250). The annual meeting was held on February 21st, and Mr. Arthur G. Lupton (chairman), who presided, stated that substantial progress had been made during the year, and the electrical energy sold was 24 per cent. more than in 1926. Economies had been effected, particularly in consequence of the more efficient plant at Ferrybridge having been brought into operation. The demand for electricity for all purposes continued to increase, and there was a notable advance in the amount of electricity sold in bulk. The business of the most important customer, the Electrical Distribution of Yorkshire, continued to grow rapidly, and there was a marked increase in the quantity required for domestic pur-

poses. Supplies to Shipley and Clayton were commenced during the year, bringing the total of local authorities receiving a bulk supply from the company to 23. The increased demands for power purposes were primarily due to the connection of new premises. There was a slightly better demand from consumers engaged in the woollen industry, but the supply to collieries was restricted, due in a great measure to the coal dispute of 1926. The mains now linked together Goole and Skipton with Todmorden and Sheffield, and a supply was now, with the co-operation of the Distribution Company, available in whatever part of the West Riding it was called for. The plans for future development provided for further extension as the necessity arose, and also the installation of additional plant at Thornhill power station. The original plant at this station was installed in 1904, and the time had now come to replace it with more efficient machinery. The Yorkshire Electric Power Act, 1927, increased the nominal capital of the company from £4,000,000 to £6,000,000, and authorised an increase in the borrowing powers from one-third to one-half of the issued share capital. It also authorised the transfer of Electric Lighting Orders and the application for new Orders. Owing to the large extensions more capital was required, and it was proposed to issue 897,000 ordinary shares at a premium of 4s. per share to rank, *pari passu*, with the existing shares, and the offer would be made to the shareholders. Mr. Lupton concluded by moving the adoption of the report, the declaration of dividends of 6 per cent. on the preference, and 8 per cent. on the ordinary capital, with a transfer to general reserve fund of £81,000, and plant renewals fund of £25,000. The report was adopted.

At an extraordinary meeting, which followed, the issue of £123,000 as ordinary shares, which, with authority previously obtained, will enable the offer of 897,000 shares to be made, was approved.

London Power Co., Ltd.

The directors' report for 1927 states that the output of the stations during the year increased from 421,766,503 to 506,387,796 kWh, and the demand from 196,303 to 226,811 kW. Notwithstanding the increased output the total income received by the company decreased from £1,706,520 to £1,681,942; this is due to economies effected in the costs of production. At the end of the year the plant capacity totalled 376,350 kW, of which some 35,000 kW is shortly to be discarded. Plant on order or in course of erection amounted to 218,750 kW, including that on order for the Deptford stations. A site on the Thames at Battersea has been acquired for the erection of a new generating station, and the consent of the Electricity Commissioners has been obtained. The ultimate capacity of this station will be approximately 400,000 kW. The whole of the generating stations and transmission mains of the constituent companies have now been transferred to the Power Company, and all the main generating stations are now directly operated by the Power Company. A scheme for pensions for the whole of the employés is being prepared, and the directors recommend an appropriation of £10,000 for this purpose. They also recommend the payment of a dividend at the rate of 6 per cent. per annum on the issued share capital.

On Monday last the company made an issue of £4,000,000 of 5 per cent. redeemable debenture stock at £97 10s. per cent. The proceeds of the issue are to be used for the general extension of the company's business, to complete the purchase of the generating stations of the constituent companies, for the purchase of land at Battersea, &c. The stock will be redeemed by means of a sinking fund, and the company reserves the right to redeem the whole or any part of the stock on or after October 1st, 1952, on three months' notice. The list was to be closed on or before Wednesday.

North Metropolitan Electric Power Supply Co.

The directors' report for the year ended December 31st last records a net profit of £358,271 (against £298,195), to which is added £9,149 brought forward, making £367,420. After meeting debenture charges, transferring £100,000 to reserve, and paying the preference dividends, a total dividend of 10 per cent. for the year is paid on the ordinary shares, leaving £19,042 to be carried forward. During the year £594,034 was spent on capital account. Approximately 150 miles of underground and 20 miles of overhead trunk and distributing mains have been laid or erected, making the total length 1,090 miles. The number of new sub-stations put into commission was 43, making a total of 251. The sales of energy rose from 118,900,000 kWh to 143,700,000 kWh—an increase of 21 per cent. The number of consumers supplied directly or indirectly increased from 69,000 to 85,000. Supply was commenced during the year in Aspenden, Buntingford, Great and Little Wymondley, Mardley Hill, Old Welwyn, Royston, St. Stephens (St. Albans), and Westmill in Hertfordshire, and in High Beech and Nazeing in Essex. Supplies of electricity in bulk were commenced to the Bedfordshire, Cambridgeshire, and Huntingdonshire Electricity Company and the Electric Supply Corporation, Ltd. (Hitchin). Rates for supply were reduced in a number of districts, and new showrooms were opened at Buntingford, Edgware, Royston, and Wembley. Good progress has been made with the new generating station at Brimsdown, which will be a "selected" station under the South-East England Electricity Scheme. The 8 per cent. second preference stock was redeemed from the proceeds of an issue of £250,000 in 6 per cent. cumulative preference shares. In June last the company's Act received the Royal Assent, and in accordance with the increased capital powers thus conferred, 425,000 ordinary shares were issued to shareholders at a premium which has been transferred to reserve. The undertaking authorised by the Stevenage and District Order, 1924, has been transferred to the company. A Bill has been deposited in Parliament to consolidate the company's Acts in accordance with the requirements of the Minister of Transport. The meeting was held on Tuesday last; a report will appear in our next issue.

The "Underground" Group.

The annual meetings of the companies forming this group on February 23rd were addressed by the chairman and managing director, Lord Ashfield. He said that 1927 was a record year; the companies themselves had carried almost 1,669 millions of passengers, and associated concerns had carried 640 millions, representing 2,273 millions—60 per cent. of the total passenger traffic of Greater London. The gross receipts had reached £13,951,391, and were largely contributed to by the success of the recently-opened extension railways. Lord Ashfield reviewed the factors affecting traffic in London, and drew the conclusion that developments were favourable to the companies' prospects. He felt that the results for the current year, unless they were overtaken by unforeseeable misfortune, should show a further advance. It was proposed to alter the method of distributing the Common Fund in such a way that account would be taken of the amount of capital upon which a dividend was to be paid. Each railway company would be given sufficient to maintain a common rate of dividend, while the omnibus company would get a double share in respect of its capital. The chairman said that the proposals of the London and Home Counties Traffic Advisory Committee vitally affected the companies' interests. The boards had come to the conclusion that the general principles underlying the scheme were acceptable and afforded a basis for the settlement of the problem. It was essential, however, to distinguish between regulative and administrative action. While the first was a proper subject for the control of a representative public body, administration must be left in the hands of those who had successfully built up the systems. In conclusion, Lord Ashfield said that the proposals of the main-line railway companies to seek road transport powers cut right across the Traffic Advisory Committee's scheme. The reports and accounts were adopted.

Metropolitan Railway Co.

Speaking at the annual meeting on February 23rd, the chairman (Lord Aberconway) said that in spite of road transport competition there had been improvement in every branch of the undertaking. The ratio of expenditure to receipts had fallen from 77.19 to 70.09 per cent. Dealing with the proposals of the Traffic Advisory Committee, he said that they could not discuss any pooling scheme which did not secure at least as good a return on their common stock as they would obtain if they remained a separate undertaking. The report and accounts were adopted, and subsequently a resolution was passed sanctioning the company's promotion of a road transport Bill.

Metropolitan Electric Cable and Construction Co., Ltd.

Mr. D. D. Warren, presiding at the first ordinary general meeting held at the Fuller Works, Chadwell Heath, on February 17th, said that the period under review had been a very trying one. The balance sheet, however, reflected great credit on their managing director, Mr. Brown, the officials, and employés. The allocations made showed that they were on good lines to strengthen the company, financially and otherwise. For the first three months after the company entered into possession of the works production was very much curtailed owing to the plant being re-arranged and re-organised in order to obtain economical production. The machinery had now been brought right up to date. The company's products had been well received by their customers, who included some of the best known collieries in the country. In addition, they had supplied numerous colliery cables to the Colonies and some of the Continental collieries. They had built up a first-rate *clientèle* amongst consumers of cables generally, and they hoped for a considerable extension of business. The report for the year ended December, 1927, was adopted, and Messrs. D. D. Warren and J. Miller were re-elected.

Midland Counties Electric Supply Co., Ltd.

The subsidiaries owned and operated by this company report a total trading profit of £250,031 (against £186,169), of which £161,265 (£131,049) is paid over to the company. To this is added £4,023 brought forward, making £165,288. The sum of £12,500 is transferred to reserve, the preference dividend is paid, and the ordinary dividend is maintained at 6 per cent.; £4,106 is carried forward. The balance sheet shows that loans from bankers amount to £260,000. To repay this and provide for extensions, the company proposes to increase the capital from £3,000,000 to £4,000,000. Meeting: March 5th.

St. Maurice Power Co.

At a meeting of the shareholders last week sanction was given to the sale of the company's assets to the Shawinigan Water and Power Co.

Northampton Electric Light and Power Co., Ltd.

The annual meeting of this company, whose report was reviewed in our last issue, was held on February 21st. Mr. F. H. Thornton (chairman), who presided, said that the most notable feature of the company's work during 1927 was the extension of the supply into rural areas. He was glad to say that the attitude of landowners and local authorities in the matter of overhead lines had become more sympathetic. A number of medium-sized farms had been connected up and good reports had been received. The chairman said that local rates added considerably to the cost of electricity; last year they represented 0.086d. per kWh, and under the new assessments the figure would rise to nearly ½d. The new 8,000-kW set was working satisfactorily, and an extension consisting of a 12,000-kW set and auxiliaries had been put in hand. During the year the number of cookers installed had risen by 50 per cent. They had reduced charges and had introduced an all-in assessment tariff which had done much to popularise the use of electricity. An extension which had been applied for would increase the area of supply of the company and its two subsidiaries to over 1,000 sq. miles.

At a subsequent extraordinary meeting the proposals for the re-arrangement and increasing of the capital were approved. The chairman said that it was not intended to make an immediate issue, but fresh capital would be required before the end of the year.

Chas. Clifford & Son, Ltd.

The directors' report opens by expressing regret at the death of Mr. Thomas Ratcliff, who had been a director since 1910 and chairman since 1912. Sir Martin J. Melvin has been appointed a director. Mr. E. H. M. White has been given a seat on the board, and he will continue to act as secretary. Mr. W. H. Frame, who had been with the business for 53 years, has also passed away. The trading of the year ended December, 1927, was affected by increasing foreign competition both at home and abroad, but the profits showed an increase notwithstanding. The net profit for the year was £19,570, and, added to the balance brought forward, gave a total of £62,477. After payment of the interim dividends on the preference and ordinary shares amounting to £3,377, the disposable balance was £59,100. There is then to be paid six months' dividend at 6 per cent., less tax, on the preference shares, and a further six months' dividend at the rate of 10 per cent. and a bonus of 5 per cent., both free of tax, on the ordinary shares; £53,247 remains to be carried forward. The reserve fund is to be capitalised by a bonus distribution to the ordinary shareholders of one new share for every five existing ordinary shares held.

Electrical Distribution of Yorkshire, Ltd.

The accounts for the year ended December 31st last show a profit of £63,217 (against £46,768 in 1926), and to this is added £15,836 brought forward, making £79,053. It is proposed to put £13,000 to reserve (making £60,000), and to pay a dividend of 9 per cent. on the ordinary shares (4½ per cent. already paid), leaving £18,723 to be carried forward. A record number of new connections were made during the year, and the demand from existing consumers continued to grow. The cooking and heating load is well established, development being encouraged by suitable tariffs and facilities for the purchase of apparatus. Further street-lighting contracts and agreements for supply to housing estates have been made. A further general reduction of prices is to be made in the spring. Two new Orders await approval; these will increase the company's distribution area to 1,160 square miles with a population of 741,000. An issue of 300,000 £1 ordinary shares, at 25s. each, was made during the year; applications for twice the amount were received from the shareholders. Meeting: March 6th.

Scottish Power Co., Ltd.

The undertakings owned and operated by this company reported an aggregate trading profit of £99,449 for the past year. Of this, £35,855 has been reserved in the companies' accounts and the balance has been paid over to the Power Co. The latter, after meeting administration expenses, &c., and adding £2,718 brought forward, shows a profit of £56,395. The debenture interest and preference dividend are paid, £5,745 is transferred to reserve, and it is proposed to pay a dividend on 250,000 ordinary shares for the year and on instalments paid on 500,000 ordinary shares at the rate of 8 per cent. per annum; a balance of £3,253 is carried forward. The report mentions that in July last the preference dividend was reduced from 8 to 6 per cent., the preference shareholders receiving fully-paid preference shares in consideration. The capital was increased to £1,500,000 during the year, and 800,000 ordinary shares and 16,667 preference shares were issued. After the annual meeting to-day (Friday) the directors will submit a resolution providing for the creation of an additional 1,000,000 £1 shares, raising the capital to £2,500,000.

Torquay Tramways Co., Ltd.

The profit for 1927 was £36,001, and after meeting debenture charges there is a balance of £29,401, plus £1,533 brought forward. £11,917 is put to reserves and renewals, £3,600 to income-tax, a distribution of 9 per cent., free of tax, for the year absorbs £13,500, and £1,786 is carried forward. The gross revenue rose from £67,533 to £73,015; passengers carried rose from 7,225,218 to 7,533,841; average receipts per car-mile rose from 18.91d. to 19.22d.; and average receipts per passenger from 1.93d. to 1.96d. Cost of energy per car-mile fell from 2.90d. to 2.05d: Considerable reconstruction work was carried out on the permanent-way. Traffic on the Torquay-Paignton road still continues to grow.

Yorkshire (West Riding) Electric Tramways Co., Ltd.

The net income for 1927 was £35,600 (as compared with £28,876 for 1926), and the addition of the balance brought forward makes available £39,766. The preference dividend is paid, and the balance (£28,664) is allocated to depreciation; there is again no ordinary dividend. The report says that it is necessary to keep all the available cash resources for development purposes, and reference is made to the capital loss sustained by the abandonment of the Normanton, Castleford, and Pontefract tramways. The whole of the available funds will be required for the motor-omnibus services. The auditors have approved the board's policy of writing down capital losses instead of paying dividends.

Power Securities Corporation, Ltd.

The gross income for 1927 was £111,796. After paying all expenses, including taxation, the available balance is £84,678, plus £16,953 brought forward. After paying preference dividend 7 per cent. per annum, less tax, and putting £30,000 to reserve, a dividend of 7 per cent. per annum, less tax, on the ordinary shares is to be paid, leaving £15,631 to be carried forward. A valuation of investments shows an aggregate value in excess of the figure at which they stand in the balance sheet. Mr. A. Spyer, of Babcock & Wilcox, Ltd., has been elected a director to fill the vacancy caused by the death of Sir James Kemnal.

London Electric Supply Corporation, Ltd.

The report for the year ended December 31st last shows a profit of £251,214, as compared with £200,079 in 1926. To this are added a balance of £1,784 and interest on investments, £16,281, and after meeting interest and sinking fund charges there is an available balance of £127,595. The final ordinary dividend is at the rate of £4 8s. 6 6/7d. per cent.; £6,993 is carried to contingencies account; and £19,709 is carried forward. The sales of energy rose from 131,873,891 to 162,047,193 kWh, and the average receipts per kWh sold fell from 1.11d. to 1.00d. Meeting: March 6th.

London United Tramways, Ltd.

The accounts for the past year show traffic receipts of £412,213, expenses totalling £367,786, and a net income of £51,785. After deducting interest, rentals, and other fixed charges, there is an adverse balance of £2,445, making the total deficiency £68,020. The unsatisfactory traffic conditions continued during the year. The directors have considered the report of the London and Home Counties Traffic Advisory Committee, and have accepted its proposals in principle; negotiations regarding details have yet to be made.

Smithfield Markets Electric Supply Co., Ltd.

Net profit for 1927, after providing for debenture and other charges, is £11,008, plus £2,323 brought forward. Further dividend at the rate of 5 per cent. (1s. per share) for the half-year, making 8 per cent. for the year; to general reserve £6,000; carried forward, £2,530. Lamps connected increased by 5 per cent., and kWh sold by 6 per cent. There was a saving in cost of production due to reduction in fuel cost during second half of the year.

Chiswick Electricity Supply Corporation, Ltd.

The profit for 1927, after transferring £14,000 to the depreciation reserve, was £28,139. It is proposed to pay a final dividend of 8½ per cent. (making 16 per cent. for the year, as before), to refund £5,250 to consumers, and to place £2,086 to general reserve, leaving £2,212 to be carried forward. During the year the capital was doubled by the creation of 100,000 £1 shares. Of these 50,000 were issued to shareholders at 21s. each.

Stock Exchange Notices.

Dealings in the following have been specially allowed by the Stock Exchange Committee under Rule 159:—

Southern Brazil Electric.—£200,000 7 per cent. prior lien debenture stock.

Yorkshire Electric Power.—897,000 new ordinary shares of £1 each, issued at £1 4s. per share, partly paid and fully paid, Nos. 1,603,001 to 2,500,000.

Telegraph Construction and Maintenance Co., Ltd.

The accounts for 1927 show a net profit of £115,135, including a sum transferred from reserves not now required. The final dividend is 7½ per cent., making 10 per cent., free of tax, as in 1926; £20,000 is put to reserve (making £350,000); directors' extra remuneration absorbs £5,000, and £112,618 is carried forward. It is stated in the report that the contracts received have not been on such a large scale as in recent years.

London and Suburban Traction Co., Ltd.

The income for 1927 at £50,459 was lower by £2,124 than that for 1926, but a reduction in the expenditure made the profit £3,523 higher at £6,226. To this is added a balance of £19,769 brought forward, and the whole amount (£25,995) is carried forward.

Dublin United Tramways Co., Ltd.

At the annual meeting on February 21st the chairman, Mr. William Hewat, said that although the board had in view considerable improvements at the power station, nothing could be done until they knew what the Electricity Board's intentions would be when the Shannon scheme was in a position to supply electricity. The Bill providing for the reconstruction of the Dublin-Lucan line secured for the company a postponement of the time when the tramways might be compulsorily acquired.

Mersey Railway Co.

Mr. J. Falconer, chairman, at the annual meeting on February 23rd, said that as a result of the progress made during the past year they had been able to declare the first dividend on the ordinary stock (½ per cent.). The improvement was the outcome of the company's sound policy since 1900 and the wholehearted co-operation of everybody connected with the undertaking.

Mather & Platt, Ltd.

The net profit for the past year was £232,946, as compared with £251,636 in 1926. Of this, £40,910 is transferred to income-tax account, and it is proposed to maintain the dividend of 10 per cent. and bonus of 5 per cent., both free of tax, leaving £131,945 to be carried forward.

Shawinigan Water and Power Co.

An issue is being made to shareholders of 300,000 common shares of no par value in the ratio of one new share for each four held, at the price of $50 per share.

A dividend of $0.5 per share has been declared on the common shares for the quarter ending March 31st.

Metropolitan Electric Supply Co., Ltd.

A final dividend at the rate of 12 per cent. per annum is recommended, making 9 per cent. for the year, against 8 per cent. for 1926.

Manila Electric Corporation.

The title of this company has been altered to "The Associated Utilities Investing Corporation."

Lancashire United Transport and Power Co., Ltd.

It is not proposed to pay any dividends in respect of the past year.

Bruce Peebles & Co., Ltd.

The ordinary dividend for the past year is again 10 per cent.

Stocks and Shares.

MONDAY EVENING.

WHATEVER else can be said about business during the past week, it cannot be accused of having been without excitement. Business generally was moderately humdrum until the 100 per cent. share bonus of Courtaulds was announced, which electrified markets and resulted in an outburst of speculative buying in many of the industrials now in favour, such as art silks, talking machines, and even, in one or two instances, electric lighting shares. The Gilt-Edged Market appears to have recovered from the cold douche administered to it by the raising of the New York Federal Reserve Bank Rate, and was in fettle all round, as was the Foreign Government Bond Market. Oils were a little more active, and in many instances higher. From all accounts it would appear that activity here has been up to the present largely the result of professional operations, the general public being conspicuous by its absence. The Rubber Market was in a very sad state, in spite of a further reduction of nearly 1,200 tons in the commodity this week.

Home Rails.

Apart from a moderate amount of buying of Great Western Railway ordinary, which has appreciated to 102, there was very little of interest in the Home Rails Market, and the same can be said of the electrified section. Metropolitans have sagged off to 66, but Districts have managed to retain their rise of the previous week, being unchanged at 70½. There have been a good many markings in Undergrounds, in spite of which the price has remained practically stationary all the week. Lord Ashfield's speech at the annual general meeting of the constituent companies created a favourable impression, and although at the present price of 21s. 6d. cumulative dividend Undergrounds barely yield 5 per cent., the market is generally of an opinion that this share will continue to gradually appreciate to somewhere near the 30s. mark.

Electric Shocks.

The outstanding feature in the Electricity Market this week was the Metropolitan Electric Supply ordinarys. A week ago they stood at 37s. 6d., to which figure they had quietly risen from round about 30s. at the beginning of the year. Steadily continuing their upward movement, they were 40s. bid by Friday morning, when suddenly, and for no apparent reason, they took it into their heads to behave like a talking machine share, and shot up to, at one time, as high as 50s., amidst much excitement and aggressive buying. They reacted afterwards, and ended the day at 46s. 6d. Considerable business has again taken place to-day on the basis of 45s. 6d. to 46s. 6d. Electric Supply were also very active, although not quite so spectacular, and have now risen to 48s. 6d., a gain of 3s. on the week. Urbans also were rather aggressively bid for, and are now 50s. The buying of these shares is obviously for something other than investment purposes, as the yields at present prices are almost negligible. Although there is nothing to prove who or what is behind this outburst of activity, the market, rightly or wrongly, attributes it to the trust which was behind the Edmundson deal. These violent price movements have, not unnaturally, inspired a certain amount of indiscriminate speculative buying of other lighting shares in the hope that they will later be "taken in hand." Metropolitans, by the way, are paying 9 per cent. for 1927, as against 8 per cent. for the previous year. Chiswicks were a good market at 55s. on the excellent report. Whilst on the subject of Chiswicks, the West London and Provincial Electric and General Trust, which controls Chiswicks, is proposing to capitalise £75,000 of reserves for the benefit of ordinary stockholders. There is £150,000 of ordinary stock in issue and in respect of each multiple of £5 holders are to receive a £5 share credited with £2 10s. paid up. After holders have paid a further £2 10s., the share will then be sub-divided into four £1 5 per cent. cumulative preference and one £1 ordinary share, which will afterwards be converted into stock. As the existing ordinary stock stands in the neighbourhood of 175, this constitutes a very handsome bonus, but it does seem rather a complicated way of doing things. Richmonds were good at 33s. 6d., as were Eghams at 25s. 6d. London Power Company have to-day issued a further £4,000,000 5 per cent. debenture stock at 97½. The Hendon Electric Company is issuing to proprietors £200,000 5 per cent. debenture stock, and intends to repay the outstanding 6 per cent. stock at 105 in August next. Holders have the right to convert into the new stock, and should without doubt do so.

Bulk Supply.

The Parliamentary Group has displayed considerable vitality, this being the "report season." The Midland Counties report was to hand this morning. The figures show a healthy increase, and 6½ per cent. is being paid, against 6 per cent. for the last few years. The board is taking powers to increase the capital by a further £1,000,000, and foreshadows an issue in the near future. The shares have risen to 25s. 6d., at which price they show a yield of 5½ per cent. North Metropolitans have been active around 40s. on the excellent results for last year, and Yorkshires have also been in active inquiry. They are now 32s. ex both dividend and rights. The new shares which are being issued at 24s. were dealt in for the first time to-day, the basis being 7s. premium. The Scottish Power report was also out this morning. Here, again, profits are well up. The same dividend (8 per cent.) is being paid, but on a larger capital. A further 1,000,000 shares are being created. The ordinary are harder at 28s. 6d. with the "New" a shilling under.

The market was very interested in the announcement of the chairman of the Newcastle-upon-Tyne Company that that company proposes to extend its area by including some 3,600 square miles of territory between the Tees and the Humber. This company is already by far the largest concern of its kind in the Kingdom, and as this proposed extension will more than treble its area, its further possibilities would appear to be very considerable. The ordinaries are now 25s. 9d., with the new 24s. 9d. bid. The report is due in the first week of March, and is being eagerly awaited. South Wales Power ordinary stock, which has not yet entered the dividend paying stage, was asked for once or twice during the week, the basis being 58-62.

Overseas Electrical Stocks.

There is really very little to report about Foreign and Colonial Electrics this week, the home group having monopolised most of the limelight. Atlas were, as usual, fairly active, but quotations are unchanged. Mexican Lights at 66½ more than retained their sharp rise of the previous week. Both the preferences are unchanged, but the 5 per cent. first bonds were a bit off colour. Adelaide 6 per cent. preference were dealt in at 21s. 6d., as was the 5½ per cent. debenture stock, the basis here being 100½. There was the usual investment business in Calcuttas round about 45s., and there was a little doing in Madras Electric without affecting the price. A bright spot was Delhi Electric preferred, which, at 50s., were the best part of 5s. to the good. East Africans were harder at 26s. 6d., with the 7 per cent. preference again in investment demand at 22s. 6d. Northern Mexico Power common rose sharply to 102 on the dividend announcement, and amongst non-dividend payers Perak Hydro-Electric ordinary were fairly active around 15s.

Cables.

The Cable Market has not been so active as of late, a not unnatural result of the absence of fresh news as to the progress

of the negotiations which are now taking place. Price movements have in consequence been few and far between, but where there has been any change it has been on the up grade, as witness the rise of 20s. in Eastern Extension. Eastern Telegraphs have recovered their drop of the previous week, and Westerns and Radios were both firm. Marconis have experienced a certain amount of selling pressure, but weak holdings have apparently been very readily absorbed as price movements have been within narrow limits. Carrying over facilities are likely to be severely restricted again at the end of the coming week, and the market position will be all the better for the little shake up which has occurred. Canadian Marconis continue round about the 13s. mark with the Marines a little harder at 39s.

Tramways.

Both London United Tramways and London Suburban Traction issues were on the dull side. It is being more and more realised that although an agreement in principle by the interested parties to a system of co-ordinated traffic for London is a step in the right direction, many more steps must be taken, and a very long time must elapse before the effect of such a scheme is felt to the extent of some distribution being made on the shares of the tramway companies. The two preferences have sagged off to round about 7s., with London and Suburban ordinaries at 2s. 6d. and London United Tramways 5s. ordinaries at 2s. It is quite possible that through lack of interest they will sag away still further, although traffics for the current year, showing as they do an increase of some 10 per cent. over the corresponding period for 1927, certainly give some little cause for hope. It is refreshing to turn to a prosperous Home Tramway concern in Torquay Trams, which were 28s. 6d. upwards in response to the excellent report, and are still considered moderately valued, as the 9 per cent. tax free dividend was earned with a comfortable margin. The Hastings Tramways Company is about to convert its tramways to the trackless trolley system, and, to raise the necessary funds, proposes to create £130,000 7 per cent. notes secured on £260,000 first debenture stock. These notes will be offered to the debenture and shareholders at 95 per cent., and in consideration of the debenture holders sanctioning the scheme their debenture interest will be raised from 4½ per cent. to 5 per cent. per annum as from April 1st, 1929. The proposals have hardly affected the prices of the existing securities, which are 48 for the debenture stock, 7s. 6d. for the 6 per cent. £1 preference, and 1s. for the 10s. ordinary. Potteries Traction preference have again been active round 8s. 6d., as have Lancashire United Transport ordinary at 9s. 3d. Cape Electric Tramways have been on the dull side as a result of a little selling which appears to emanate from the other side. The possibility of motor-'bus competition is mentioned as a reason, but rather curiously current traffics are on the up grade. The present price is 16s., showing a yield on current dividends of 7½ per cent., tax free. Foreign Tramways have shown no outstanding feature. Brazil Tractions were dull, and at 205 shed nearly 10 points. Mexico Tramways 5 per cent. bonds were also off colour at 81, although the common were a good market around 36. Anglo-Argentine Tramway stocks displayed their usual activity, without affecting prices in any instance, and the same thing can be said of the British Columbia Electric Railway Company, apart from a rise of 2 points in the deferred.

Manufacturing.

Metropolitan-Vickers ordinary have again been the centre of attention in the Electrical Equipment Group. The mystery of the sudden rapid rise to 37s. was solved by the announcement that Mr. Dudley Docker had re-acquired the control of this company, which he had previously sold to Vickers, Ltd. In a Press interview Mr. Docker foreshadowed a diminution in the ordinary dividend for the past year. This did not tend to improve matters, as most people were looking for an increase on the 8 per cent. paid for the last few years, and prices fell away rapidly in consequence. The shares are now no better than 31s., a drop of some 6s. from the highest. Westinghouse Brake at 28s. 6d. x.d. were on the dull side. The report of the Power Securities Corporation with an increase in dividend from 6¼ per cent. to 7 per cent. was liked in market circles, and resulted in a small inquiry for the shares, which hardened to 27s. Aron Meter preference were also in inquiry, and better at 17s. 4½d., as were British Electric Transformer 7 per cent. preference, which changed hands as high as 19s. 9d. Practically the whole of the ordinary shares of the British Thomson-Houston Company are held privately, but what public shareholders there are have this week-end received a letter from the secretary of the company asking them if they are desirous of disposing of their holdings, and if so to state the lowest price they would be prepared to take. No dividend has been paid since June, 1926, and the shares are probably not worth much more than their nominal quotation of about 15s., but, on the other hand, in companies like this with a minority holding there is always a thing called "nuisance value," a fact not to be lost sight of by holders, especially those who acquired their shares "higher up." Babcock & Wilcox have stood out, the price advancing some 5s. to 69s. Purchasers at this price evidently anticipate some sort of a "melon" as the yield is now under 4 per cent., tax free. Telegraph Construction £12 shares were inclined to the dull side on the report, which, although maintaining the dividend at 10 per cent., tax free, shows a drop of some £10,000 in net profits.

Share List of Electrical Companies.

	Nom.	Dividend. 1925.	Dividend. 1926.	Price Feb. 27. 1928.	Rise or fall.	Yield. p.c.
Home Electricity Companies.						
Bournemouth and Poole	£1	14†	14†	64/-	—	4 7 6
Brompton Ordinary	£1	10	8⅝	25/-	—	5 12 0
Charing Cross Ordinary	£1	15	8½	26/6	—	5 5 8
do. do. 4½% Pref.	£1	4½	4½	17/6	—	5 2 10
Chelsea	£1	12	8⅝	26/-	—	5 7 8
City of London	£1	15	10	31/6	—	4 8 11
do. do. 6% Pref.	£1	6	6	23/-	—	5 4 4
Clyde Valley	£1	8	8	34/-	—	4 14 2
County of London	£1	15	7½	34/6	+2/-	4 3 9
do. do. 6% Pref.	£1	6	6	23/-	—	5 4 4
Edmundsons' Ordinary	£1	8	10	67/6	—	2 19 2
do. 7% Pref.	£1	7	7	25/6	—	5 9 10
Elec. Supply Corporation	£1	11	11	48/6	+3/-	4 14 6
Kensington Ordinary	£1	15	8	26/-	—	5 7 8
Lancs. Light and Power	£1	7½	7½	27/6	—	5 9 1
London Electric	£1	10	8½	25/6	—	5 9 10
do. do. 6% Pref.	£5	6	6	5½	—	5 8 2
Metropolitan	£1	11	8	46/-	+8/6	3 18 3
do. 4½% Pref.	£1	4½	4½	17/-	—	5 8 6
Midland Counties	£1	6	6	25/6	—	4 14 1
Newcastle-on-Tyne Ordinary	£1	7	5	25/9	+9d.	3 17 8
do. 5% Pref.	£1	5	5	18/-	—	5 10 0
do. 7% Pref.	£1	7	7	26/-	+1/-	5 7 8
Notting Hill 6% Pref.	£10	6	6	10½	—	5 11 7
North Met. Elec. 6% Pref.	£1	6	6	23/-	—	5 4 4
St. James' and Pall Mall	£5	17½	8	27/-	—	5 3 8
South London	£1	15	8½	25/6	—	5 9 10
South Metropolitan Pref.	£1	7	7	1½	—	6 8 0
Urban Ordinary	£1	7	7	50/-	+1/3	2 16 0
do. 6% Pref.	£1	6	6	1⅞	—	5 13 0
Westminster Ordinary	£1	15	8½	26/-	—	5 7 8
Whitehall Elec. Invst. 7½% Pref.	£1	7½	7½	21/10½	—	6 17 0
Yorkshire Elec.	£1	8	8	32/-x all	—2/6	5 0* 0
Home Rails.						
Central London Ord. Assented	Stock	4	4	74xd	—1	5 8 1
Metropolitan	,,	5	3	66	—2	4 10 11
do. District	,,	3½	3½	70½	—	5 13 6
Underground Electric	£1	Nil	1½	21/6	—	4 13 0
do. do. Income	Bonds	6	6	108	—	5 11 1
Telegraphs and Telephones.						
Anglo-Am. Tel. Pref.	Stock	6	6	94½	—	6 7 0
do Def.	,,	1½	1½	23	—	6 7 8
Automatic Telephone	£1	3	10	48/9	—	4 2 4
Chili Telephone	£5	5	6	7⅞	—	3 18 3
Eastern Extension	£10	10	10	16	+1	*6 5 0
Eastern Tel. Ord.	Stock	10	10	145	+5	*6 17 11
Globe Tel. and T. Ord.	£10	10	10	14⅜	—	*4 15 7
do. do. Pref.	£10	6	6	10½	—	5 17 1
Great Northern Tel.	£10	20	20	39	—	5 2 7
Indo-European	£5	8½	10	35	—	*6 1 5
Marconi	10/-	Nil	*5	57/-	—	1 15 0
Marconi-Marine	£1	7½	8⅜	39/-	—1/6	4 17 3
Oriental Telephone Ord.	£1	12	12	51/3	—	*4 13 6
United R. Plate Tel.	£5	8	8	10⅜	—	*3 15 3
Western Telegraph	£10	10	10	14	—	*7 2 10
Home and Foreign Trams, &c.						
Anglo-Arg. Trams First Pref.	£5	5½	5½	8⅜	—	7 6 8
do. do. 2nd Pref.	£5	6	6	8⅝	—	7 14 10
do. do. 5% Deb.	Stock	5	5	80	—	6 5 0
British Electric Traction Def. Ord.	,,	—	—	510	—	... ...
do. do. 8% Pref. Ord.	,,	7	8	124½	—	6 8 6
Brazil Traction	100	5	6	205	—9½	2 18 6
Brit. Columbia Elec. Rly. Pce.	Stock	5	5	93½	—	5 6 11
do. do. Preferred	,,	6½	6½	160½	—	*3 17 11
do. do. Deferred	,,	8	8	204½	+2	*3 18 3
do. do. Deb.	,,	4½	4½	84½	—	5 0 7
London & Sub. Trac. 5% Pref.	£1	Nil	Nil	7/-	—1/-	... ...
London United Tram Deb.	Stock	4	4	55½	—	7 4 2
Mexico Trams, 5% Bonds	—	5	5	81	—2	6 6 4
Mexican Light Common	£100	Nil	Nil	66½	+1	... ...
do. 7% Pref.	£100	Nil	Nil	78	—	... ...
do. 1st Bonds	—	5	5	79½	—½	6 9 4
Yorkshire (West Riding)	£1	5	—	7/6	—	... ...
Manufacturing Companies.						
Babcock & Wilcox	£1	13	13	69/-	+4/9	3 15 4
British Aluminium Ord.	£1	12½	10	51/3	+1/3	*3 18 1
British Elec. Transformer Pref.	£1	7	7	18/3	—	7 13 6
British Insulated Ord.	£1	15	15	4½	—	3 13 9
Brush Ord.	£1	10	10	29/-	—	6 17 11
Callenders	£1	15	15	3½	—	3 16 4
do. 6½% Pref.	£1	6½	6½	23/-	—	5 9 5
Crompton Parkinson Pref. Ord.	£1	—	—	17/6	—	... ...
Edison-Swan	£1	10	10	10/-	—	4 0 0
do. 5% Deb.	Stock	5	5	90	—	5 11 0
Electric Construction	£1	10	7½	26/-	—	5 15 5
Enfield Cable Pref.	£1	7½	7½	26/3	—	5 14 3
English Electric	£1	Nil	Nil	9/6	—	... ...
do. do. Pref.	£1	6	8	12/6	—	... ...
Gen. Elec. Pref.	£1	6½	6½	24/-	—	5 8 4
do. Ord.	£1	7½	7½	36/-	—	4 3 4
Henley	£1	20	25	5½	—	4 10 11
do. 4½% Pref.	£5	4½	4½	4¼	—	5 6 0
India-Rubber	£1	5	Nil	13/-	+6d.	... ...
Johnson & Phillips	£1	17½	12½	53/9	—	4 12 7
Met.-Vickers Ord.	£1	8	8	30/6	—3/6	5 4 11
do. Pref.	£2	8	8	2⅜	—	6 1 11
Siemens Ord.	£1	7	7½	31/6	+1/-	4 15 3
Telegraph Construction	£12	10	10	24½	—1	*4 19 0

* Dividends paid free of Income Tax.
† 4% of which was Tax Free.

The British Industries Fair.—III.

Electrical Visitors to the Birmingham Section. Further Exhibits in both Sections.

MORE has been done this year than ever before to secure the interest of influential bodies in the Fair; every day one or more luncheons have been given by the Management Committee at Birmingham, to representatives of industrial, trade, technical and educational associations. Many export trade organisations have officially visited the Fair, and their speakers were practically unanimous in expressing preference for British goods, recognising their undoubted superiority, although now and again the thorny question of price was mentioned. All the leading bodies of the electrical industry have been enabled to see for themselves what British manufacturers can do, and they were all favourably impressed by the excellent electrical display.

Their Majesties the King and Queen, this year made a point of seeing both sections. One of the stands at Birmingham which interested the King was that of Berry's Electric, Ltd., his attention being attracted by the bright display of "Magicoal" fires. During the visit Messrs. H. H. Berry, T. R. Martin, E. J. Jennings and R. A. Chattock had the honour of being presented to the King. His Majesty later sent a message to the Birmingham Chamber of Commerce, congratulating it upon its enterprise and the evident success of its efforts.

Electrical Associations at Birmingham.

There was a large attendance of representatives of the electrical industry at the Birmingham section on Friday last. Delegates were present from the following:—The Institution of Electrical Engineers, The Association of Consulting Engineers, The Electrical Contractors' Association, The Electrical Contractors' Association of Scotland, The National Federated Electrical Association, The Electrical Wholesalers' Federation, The Illuminating Engineering Society, and The Association of Mining Electrical Engineers.

Mr. G. N. Guest, president of the Chamber of Commerce, presided at a luncheon and amongst those present were the Lord Mayor (Alderman A. H. James), Mr. A. Page, President of the Institution of Electrical Engineers, Alderman Sir Percival Bower, Deputy Lord Mayor, Councillor H. K. Beale, chairman, Birmingham Electric Supply Committee, Doctor A. H. Railing, General Electric Co., Ltd., Mr. R. A. Chattock, chief electrical engineer, Birmingham, Mr. J. D. Watson, Mr. Ll. B. Atkinson, director, Cable Makers' Association, Mr. Leete, president of the C.M.A., Mr. W. A. Shaw, president, Electrical Contractors' Association, Mr. Stretton, president-elect, Electrical Wholesalers' Federation, Mr. A. Pratt, Electrical Contractors' Association of Scotland, Mr. H. H. Berry, Mr. T. R. Martin and Mr. E. J. Jennings, of the Electrical Advisory Committee, Professor Cramp, University of Birmingham, and Messrs. G. M. Harvey, G. O. Donovan, R. C. Rodgers, J. M. Donaldson, M. J. Railing, E. C. A. Walton, E. G. Batt, F. J. Collis, L. C. Penwill, A. C. Cramb, W. Wilson, and A. McKinstrie and Col. W. J. Kent, Electrical Porcelain Manufacturers' Association.

Mr. JENNINGS, secretary of the Electrical Advisory Committee stated that many apologies for absence had been received, from, among others, Sir John Snell, Chief Electricity Commissioner, Sir Andrew Duncan, Dr. Ferranti, Sir Benjamin Longbottom, and Mr. T. Rowell, secretary of the Institution of Electrical Engineers, who was seriously ill.

Mr. Jennings read a letter from Sir John Snell in which he said that the Commissioners and the Advisory Committee had the same aim in view—to maintain the largest possible output of the best electrical products which our country could develop. The Commissioners were clearing the ground for an abundant harvest of increased sales of electricity and electrical apparatus. The CHAIRMAN, in submitting the toast of "The Visitors" gave a hearty welcome to the electrical engineers. He said that the Electrical Section was bigger by 20 per cent. than the display of 1927, the number of electric firms showing being 80. The exhibitors came from all over the country, and there was one from Canada. Mr. Guest reminded them that the gas industry was also much better represented, and the indications were that this section would show considerable development. The Chamber of Commerce had recently enlarged the site of the Fair by 15 acres and it would seem that further extensions might have to be made.

Mr. A. PAGE, in reply, said that a visit to the Fair was certainly a tonic to every British engineer, and he was satisfied that overseas visitors would agree as to its excellent and comprehensive nature. It was specially appropriate and important that the Electrical Section of the Fair should be impressive and convincing, as that was bound to foster a feeling of confidence in our engineering practice which had been such an asset since the beginning of the steel age. We no longer had the monopoly we had then, but to judge by the gratifying success which was attending the enterprise of electrical manufacturing firms in the export branch of their business, British engineers were entitled to say that they were very firmly established. We at home must practise what we preach, by buying only British-made plant. Mr. Page said he was, of course, primarily concerned with the electric supply industry—that plaything of the politician. The industry was co-operating with the Central Electricity Board in a mass attack on obsolete methods of production as the first stage towards better things. A beginning had been made in Central Scotland, and as far as he was able to judge, his fellow countrymen seemed to like it, which was praise indeed. The second scheme, for South-East England including London, had now been adopted by the Board, and soon it would be the turn of Central England, with Birmingham in the forefront. The visitors hoped that the Fair would satisfy the fullest aspirations of its public-spirited promoters.

Dr. RAILING (G.E.C.), also responding, stated that the Fair had grown from a small beginning until, through the optimism and hard work of the early members, it had become the thorough success they saw to-day. The chairman had referred to the earning capacity of the industry, but the electrical engineering industry in this country made less than 3 per cent. on its total capital, for American and Continental competition was very keen. Yet in spite of the fact that they could not pay proper remuneration to capital in the big firms, they had gained an ever-increasing proportion of the world's electrical market.

Another Electrical Visit.

On Saturday last delegations attended the Fair from the Association of Supervising Electrical Engineers, the Electrical Power Engineers' Association, and the Meter Engineers' Technical Association; and they were entertained to luncheon by the Fair Management Committee. Col. Walduck presided, and he was supported by Mr. R. A. Chattock and Mr E. J. Jennings, Mr. Guest (president of the Birmingham Chamber of Commerce), Messrs. A. Brammer, L. W. Medcalf, A. C. Stewart, Alan Kirk, E. Faussett, A. Middleton, A. Jones, J. W. Thomas and G. W. Essex.

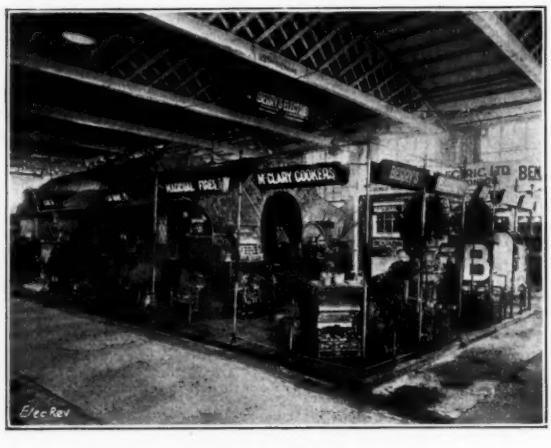
Col. WALDUCK, in submitting the toast of the "Electrical Industry and Visiting Associations," observed that the industry had grown enormously in recent years. That growth was reflected in the large increase in the number of exhibits at the Fair. There was indeed truth in the slogan: "Electricity your best servant." He believed there was a great future for electricity in industrial heat treatment and the domestic sphere.

Mr. Alan Kirk, in responding to the toast, said that the promoters of the Fair had shown imagination, enthusiasm, and perseverance.

Mr. A. C. Stewart, who also replied, referred to recent electro-metallurgical developments, and pleaded for a practical application of the slogan "Buy British Goods." Upon looking at his Electrical Review each week he regretted to see that there were far too many contracts being placed abroad by corporations and contractors. It was only by hanging together that we should survive the present time of stress. Mr. A. Middleton also responded in the absence of Mr. G. F. Shotter by reason of a bereavement.

Business at Birmingham.

The Birmingham section was better attended during the first week of the Fair than any previous one. The bulk of the buyers last week were for the home trade, and, generally speaking, stand-holders reported that the amount of business done and the number of trade inquiries received were substantially in advance of 1927. According to the Fair authorities, the home buyers showed an increase of nearly 40 per cent., and of export buyers of rather more than 25 per cent., but they point out that it is during the second week that the bulk of the overseas buyers attend. It is a matter of interest that there have been many German buyers at the Fair.

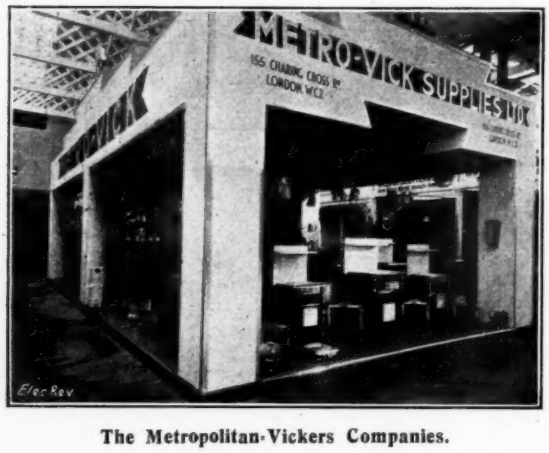


Berry's Electric, Ltd.

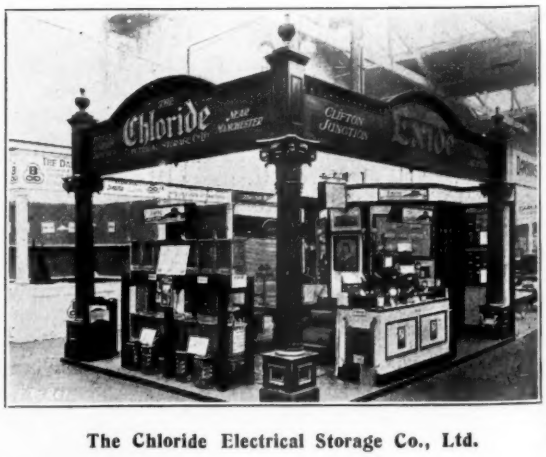
The General Electric Co., Ltd.

The British Thomson-Houston Co., Ltd.

The Bromford Tube Co., Ltd.



The Metropolitan-Vickers Companies.



The Chloride Electrical Storage Co., Ltd.

Some of the Stands at Birmingham.

Some of the Exhibits.

Details and Illustrations.

J. H. Tucker & Co., Ltd.

This company again shows a complete range of its electrical products, comprising tumbler switches, electric lighting and power accessories, fuseboards, ironclad gear, &c. A standard 5-A "Tucker" switch is on view, mechanically operated 120 times an hour under a 50 per cent. overload at 220 V. One of these standard 5-amp. switches has successfully broken a load of 33 A at 250 V in a test carried out at Faraday House. A new lampholder is shown. It possesses an improved "one-piece" cord grip having no loose parts, which does not involve the use of a set screw, and in which twisting or rubbing of the flex cannot take place during assembly of the holder. Solid "one-piece" plungers and terminals are fitted. The lampholder fully complies with B.E.S.A. specification No. 52. A new adaptor is also on view. As in the lampholder described solid "one-piece" contacts, eliminating screwed or riveted joints, are embodied in it. A wide, knurled finger-grip enables the cap to be tightened easily, firmly, and securely.

A new range of 10/15-amp. fuseboards, combining the protective advantages of Home Office type fuse units with neat, easily handled and compact teak cases, is also shown. These are available with from 2 to 16 d.p. ways. The fuse banks consist of Tucker miniature Home Office type fuse units, mounted on substantial rust-proof mild steel cross battens, instantly removable for wiring. The fuse handles are self-aligning, and possess a spring grip which prevents them being loosened by vibratory action. Copper bus-bars of ample cross section feed the fuse units, connection to the main supply being made through heavy pinching screw terminal sockets. All live parts are effectively shielded by porcelain. In an N.P.L. test one of these fuse units, normally rated at 15 A, successfully dealt with a short circuit current of 2,000 A at 240 V d.c. without damage. The company shows a miniature combined 10/15-A d.p. switch with 2-way d.p. fuses in an iron case, which may be used for taking both a light and power supply off the same switch through separate fuses, or as a sub-distribution board with main switch.

Further exhibits are a new cooker control unit; "all-insulated" tumbler switches, adaptors, wall sockets and plugs, &c.; universal conduit boxes; and miniature ironclad service gear.

J. Shaw & Sons (Wolverhampton), Ltd.

This company is a recent comer to the electrical field, although it has established its name in the hardware world. It produces a number of domestic appliances. One of these is the "Trojan" toaster illustrated in fig. 15. This is provided with a coiled element and is closed in by two vertically opening doors upon a ridge in which the bread is placed. The lifting handle and the door knobs are of coloured erinoid, and

Fig. 15.—The "Trojan" Toaster.

the whole appliance is brightly finished. The kettles shown are claimed to be so designed that quick boiling is procured. The elements are graded with the size of kettle to ensure the contents reaching boiling point in seven minutes. Irons, lighting fittings and other appliances are also shown, as well as many items for which the company is agent.

Gent & Co., Ltd.

This company manufactures products of many kinds, and, as at previous Fairs, the stand bears a very varied collection. Among these mention may be made of the "Pul-syn-etic" clocks, sirens, mine-signalling apparatus, water-level indicating and recording equipment, fire alarms, and radio apparatus. The company has adapted its "Radiomatic" receiving set to operate on short wave-lengths, as well as on the ordinary ranges. The change-over is effected by the substitution of a connector bar for the one in position. A new "Touchtone Cone" loud-speaker has also been introduced. This is claimed to give true production throughout the musical scale; it is also very decorative, having a pleated silk front.

Rheostatic Co., Ltd.

The chief exhibit of this company is the "Satchwell" thermostat (fig. 16). It is claimed for this device that it can maintain the temperature of a room to within 1 deg. F., and that comparatively large currents (10 A at 250 V) can be broken directly at its contacts eliminating relays. It is designed primarily for a.c., but it can be used for d.c. up to 6 A by the employment of a condenser of suitable capacity. The principle upon which the thermostat operates is the obtaining of a fall of temperature at the contacts at the instant of the fall of the current to zero, thus avoiding arcing. It is stated that the contacts can deal with a current of 10 A at 250 V for 100,000

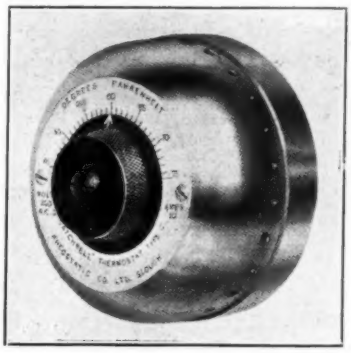


Fig. 16.—The "Satchwell" Thermostat.

times before requiring renewal. The contact-bearing expanding member is readily removable and is suitably connected with an adequate adjustment knob working over an open scale of temperature.

Holden & Hunt.

The machines shown on this stand comprise electric welders, rivet heaters, and soldering iron heaters. The soldering iron heater, shown for the first time, is a bench machine, and is an adaptation of the rivet heater. Any ordinary soldering iron can be used, but it is necessary for the copper bit to be drilled across the flats, tapped, and a steel stud screwed into it so that it projects about ¼ in. on each side of the bit. The iron is then placed in the machine and gripped by the stud. As the current flows through this stud its high resistance causes the stud to become heated, and this heat is absorbed by the copper so that the soldering iron rapidly reaches a soldering temperature. An iron of average weight can be heated up in from 35 to 60 seconds, and gives a minimum soldering time of 3½ minutes. The No. 2 size spot welder shown is an 8-kW machine capable of welding up to ¼ in. total thickness in steel on repetition work, or 3/16 in. occasionally. The No. 3 is a 12-kW machine which will weld up to a ¼-in. total thickness in steel on repetition work, or 5/16 in. occasionally, whilst the No. 4 has an electrical capacity of 25 kW and a welding capacity of ⅜ in. total thickness of steel on repetition work, or ½ in. occasionally. These machines are controlled entirely by a foot pedal so that the operator's hands are free. Means for fitting special jigs and stakes, and the arrangement of the pedal enables it to be adjusted forward, backward, or swung in a complete half circle, together with a rise and fall adjustment. The 25-kW two-head rivet heater exhibited is representative of a line of heavy duty machines, and is designed for dealing with rivets up to ¾ in. diameter. A well-designed example of hand-operated butt-welding machine is also shown. This welder is intended primarily for heavy jobbing work, and is capable of welding up to one square inch section. It is rated at 30 kW, and is water cooled throughout. The "upsetting" pressure is applied by means of a powerful eccentric cam designed to give the pressure in a direct line with the required "upset" and to prevent any twisting or unbalancing force from acting on the slide. The switch is foot-operated and the heating speed controlled by means of a three-way regulator. Wire-welding machines are also exhibited.

Batteries, Ltd.

An interesting exhibit on this stand is the "Nife" electric miner's lamp. This has a fluted drawn steel body which gives exceptional strength, at the same time reducing weight. A special bayonet joint replaces the usual screwed joint, thus saving time in the lamp room. The spring contacts give the minimum number of contact points, preventing light flicker, and the whole contact arrangement can be dismantled by the loosening of two screws only. White enamel reflectors in conjunction with a high candle power bulb provide plenty of even illumination, and the frosted well glass assists diffusion

and reduces eyestrain to the minimum. A magnetic lock is provided. The accumulator is of the nickel-steel alkaline type. A charging rack which allows the cells to be suspended by their specially shaped terminals is shown. There is also on this stand a range of "Nife" accumulators suitable for the propulsion of electric vehicles and factory trucks; the operation of electric switchgear; emergency work on board ship; wireless; hospital emergency lighting, &c.

Record Electrical Co., Ltd.

A complete series of switchboard and portable indicating instruments is shown by this company, including ammeters, voltmeters, cut-outs for accumulator charging boards, ohmmeters and generators for insulation testing, demonstration instruments for use in technical schools, and circuit-breakers for power circuits. It is claimed that "Cirscale" moving-iron a.c. instruments with a well divided scale extending over an arc of about 270 deg., give accurate readings discernible from a considerable distance, prompt indications, efficient damping, and negligible temperature errors. The movement is unaffected by stray magnetic fields and is less sensitive to frequency changes than the induction-type instrument. The change-coil volt-ampere testing set shown consists of two separate movements combined in one case. The energising coils are detachable and accessible from the exterior and arranged to be easily changed, eliminating the use of shunts and transformers. To give greater accuracy for the readings on the ampere side the scales are fitted on a hexagon drum which is revolved so as to bring into position the one required. The set is complete in itself and is suitable for a.c. or d.c. testing from 0-750 V and from 0-600 A. The change-coil ammeters are similar, but are fitted in a smaller case with the voltmeter ranges eliminated. The "Record" ohmmeter and generator set is combined in a strong teak case with a carrying handle which can also be used as a shoulder strap. The chief advantages are direct reading, light weight, and convenient carrying size.

Macintosh Cable Co., Ltd.

Two developments in the application of its "Maconite" insulated cables form the principle features of this company's exhibit. The first is the Macintosh industrial wiring system, of which a complete range of accessories is shown. These are made in a moulded insulating material which is unaffected by fumes, moisture, &c. The "Maconite" cables are led into the fittings through glands of "Maconite," with which the accessories are rendered gas-tight. A special tool is provided for piercing the glands where necessary to take the cables. The second special application of "Maconite" which is shown is not entirely new. It is the Macintosh overhead distribution system, the purpose of which is to reduce the cost of electricity supply to housing schemes, villages, &c., where buried mains would be prohibitive in price. The supply is led from house to house by means of special "Maconite" insulated cables, supported in porcelain cleats beneath the eaves. Connection is made to each consumer's circuit by means of "Maconite" insulated cables led in through the walls by a porcelain tube. For wide house to house spans iron angle brackets and porcelain insulators are provided. A complete range of the company's cable products is shown, from "Maconite" bell wire to cables for pressures up to 33,000 V. The range includes paper cables made at the Liverpool works and "Maconite" and rubber cables made at Derby. The Macintosh wiring system, colliery cables, ship wiring cables, joint boxes, cut-outs, &c., are included, and demonstrations of cable jointing are being given.

Pulsometer Engineering Co., Ltd.

A selection of the company's pumps forms the main part of this exhibit. It includes a steam pump; several centrifugal pumps, including the "Resiline" pump, rubber lined, specially designed to withstand the action of corrosive and abrasive liquids, and the stereophagus pump for sewage purposes; a representative turbine pump capable of delivering 500 gallons per minute on a head up to 3,000 ft.; a "ring" pump, which is a high speed plunger pump; and the "Geryk" vacuum pump. The last is of the single stage rotary type capable of giving a vacuum of .02 mm. from perfect. Two stage pumps give a vacuum of .002 mm. from perfect. These vacua are not limited to small pumps, but can be obtained by large pumps for factory use. Other exhibits of the company are refrigerating plant, filtration plant, and sirens.

Electric Transmission, Ltd.

Upon this stand are displayed the products of three companies—Electric Transmission, Ltd., Taylor, Tunnicliff & Co., Ltd., and Micanite & Insulators Co., Ltd.

Electric Transmission, Ltd., has a very complete exhibit of overhead transmission line material. Pin and cap and pin or metal-hooded insulators are shown. The range of pin type insulators includes units suitable for working at pressures between 1 and 66 kV. The cap and pin type are arranged in strings for suspension and strain positions, consisting of strings of four and five insulators in series fitted with double arcing horns suitable for a working pressure of 66 kV, and strings of eight insulators fitted with grading shields and arcing horns suitable for 132 kV. Another class of exhibit is air-break switchgear for outdoor mounting. A number of 3-pole switches are exhibited for working pressures up to 33 kV, including air-break switches and remote-controlled isolating switches suitable for horizontal and vertical mounting. There is also a selection of all-porcelain outdoor type transformer bushings for from 1 kV to 33 kV.

All the porcelain exhibited on the stand is manufactured by Messrs. Taylor, Tunnicliff & Co., Ltd., but independently of the other two exhibitors they are showing a number of large porcelain parts such as shells for 110-kV oil-filled transformer bushings. Other items are porcelain insulators for telephone and telegraph lines, porcelains for electrical accessories, insulating beads and refractory materials for electric fires, &c.

The Micanite & Insulators Co. shows a comprehensive range of insulating material. Mica and micanite for commutator end rings, &c., are shown, also a selection of insulators made from "Paxolin" insulation. "Paxolin" in the form of sheets and tubes is exhibited. An interesting feature is a range of condenser type insulators made by interleaving metal foil and "Paxolin."

Revo Electric Co., Ltd.

There is a large and varied display of products on this stand and space can be found only for mention of the principal exhibits. A new item is the "Revo" wash-boiler (fig. 17). This has a cast-iron frame and a porcelain-enamelled sheet steel body. The interior of the boiler is of heavy-gauge tinned copper. There is a sum in which immersion elements are fitted. Access to them is gained by the removal of a front plate, and it is found that each element (600 W) is plugged in and secured by two easily-removed screws. To prevent the burning out of the elements the main tap is fitted above the sump

Fig. 17.—The New "Revo" Wash Boiler.

level; the sump is drained by another cock. A new breakfast cooker is shown. This is also of cast-iron and porcelain-enamelled sheet metal. A grill and a boiling plate are provided with separate elements, each controlled by a three-heat switch. A drop-down front door is fitted. Samples of "Revo" cookers appear; a new departure is the provision of a porcelain-enamel finish as a standard without extra charge. The company states that large numbers of these cookers have been supplied to the Corporations of Manchester, Glasgow, and Liverpool, and over 100 other authorities have adopted them in their hire schemes. There is also exhibited a special safety device for kettles which eliminates the fusible plug, and is reset by a plunger. Industrial lighting fittings, radio apparatus, street-lighting standards, and many other appliances are included in the exhibit.

W. McGeoch & Co., Ltd.

As in previous years, this company displays a selection of its ships' fittings, among which are many lighting devices. One new exhibit is a double berth light fitted with a change-over switch to put either the main light or a night light in circuit. A small searchlight for use by lifeboats and for other marine purposes is shown. It is fitted with a gasfilled lamp and provides a very adequate beam for local use. The stand bears an unusual form of electric fire in which four vertical pencil carbons are clipped in holders; a newly-produced 600-W bowl fire with a copper reflector is also shown. The company has recently commenced a department for the manufacture of automobile and tramcar fittings, and a large display of these, which includes lighting fittings, is to be seen. In addition there is a collection of the company's standard switch- and fuse-gear, lighting fittings, navigation lights, &c.

Electric Fires, Ltd.

This stand is itself constructed entirely of various "Heatrae" products. The pillars are formed from hot pipes, low-temperature air warmers, immersion heaters, &c., as are also the cross members. The exhibit itself includes several patterns of electric water heaters, suitable for general hot water supply, bath water heating, &c., types being shown which are suitable for working in conjunction with ball valve cisterns, and also types specially designed for connecting direct to water supply mains. There are samples of instantaneous geysers in 4- and 8-kW sizes, and a wide range of immersion heaters. Examples of water urns and glue kettles are also shown. The company's oil heaters are represented by an 18-kW heater. This has a welded steel casing and is fitted with a series of immersion heaters with instantly replaceable cores. Examples of low-temperature air warmers are shown, some practical models having been developed for floor and wall mounting. These appliances contain no water or oil and no air spaces in which gases can collect. There are also examples of "Heatrae" hot pipes fitted with a withdrawable heating unit; a cabin heater complete with ironclad control panel, specially designed for use where there is risk of fire; and a tubular heater to prevent condensation on shop windows. There are several examples of the application of electric heating to industrial work, including a new type of glossing or treeing iron with regulating panel as used in the boot trade, and a series of industrial pattern hot plates. Other items are warming plates, towel rails, and whistling kettles. A wide variety of electric fires is shown. These include imitation coal types in various patterns, in which the heating bars are arranged in the front so that the heat is thrown forward. There are also various models of portable reflector pattern fires. The cooking apparatus shown includes rapid griller-toasters, griller-boilers, breakfast cookers, and small cookers.

Moffats, Ltd.

This Canadian company is a pioneer in the manufacture of electric cookers and claims to be the first stove firm on the American continent to produce an electric cooker. The fact that it has kept up-to-date is authenticated by the receipt of a gold medal by the company at the New Zealand and South Seas Exhibition, Dunedin. The design of the cooker, common to all the examples shown, has aimed at simplicity and efficiency. Elements are fitted in the top and bottom of the oven, and the bottom ones are covered by a specially-shaped heat deflector plate. The oven itself is electrically welded into one piece. The whole of the connections and fuses are housed in a compartment at the side of the cooker, and the insulation of the leads is carried right into the porcelain connector boxes, eliminating the risk of shock entirely. The elements are similar (but smaller) to those employed in the company's electric furnaces and are able to stand up to a temperature of 1,600 deg. F. The three-heat snap switches are of bakelite or celeron and are thus shock-proof. Enclosed type boiling plates are fitted, and the oven is porcelain enamelled inside and out. With each cooker a combined instruction and cookery book is presented.

The Cable Makers' Association.

This exhibit illustrates the various types of cable used for power and lighting purposes, as also some of the more ordinary types of underground telephone cable. The classes shown are as follows:—Rubber-insulated cables, including lead-covered and armoured cables and certain types of flexible cords, and various types of flexible cables with external braiding, flexible armouring, spiral wire armourings and other methods of protection. One case contains samples of cables which are used for general distribution on board large ships (ring main cables), and the same case shows the types of flexible cable used for small motors on deck cranes, and for portable lighting on deck. Another exhibit shows the method of insulating underground main cables with paper, cambric, bitumen or rubber insulations, and a companion case comprises the same types of cables with other descriptions of conductors and with various styles of armouring and protection. Telephone cables and under-water power cables are also displayed. Several house-wiring systems are represented by rubber-insulated braided cables run in special conduit tubing, metal-sheathed and c.t.s. cables for surface wiring, and various accessories.

Thermo Path Co., Ltd.

Prominent among the exhibits on this stand are several "Meracol" fires. These are of the bowl type fitted with a circular coiled element, in front of which is an auxiliary reflector—there is no direct heat. The fires are shown mounted in art metal fire screens, which are very effective. A new soldering iron is exhibited. In this the element (150 W) is very easily replaced if necessary, and the copper bit is screwed in.

William Soutter & Sons, Ltd.

This is a bright display, consisting mainly of electric kettles, on this stand. In addition there are sterilisers, irons, and fires. The principal feature is a safety device which is shown applied to kettles and sterilisers. This is a thermally-operated switch arranged to act automatically when the appliance to which it is fitted boils dry. It is reset by pressing a knob, and there are no renewable parts.

Thor Lamps & Supplies, Ltd.

Many types of lamps for use in mines are to be seen on this stand. These include miners' hand lamps, inspection lamps, and heavier patterns for shaft and roadway illumination. A charging rack in which the lamps are hung up by their hooks is exhibited, and there is a double-charging stand which has a tubular framework in which the c.t.s wiring is run. The use of fuses is obviated by small free-handle circuit breakers.

The "Typerlite" Co.

This firm's exhibit comprises examples of the "Typerlite" fitting designed particularly for typists' desks. Its employment is not confined to this, however; there are special designs for other purposes in offices, factories or shops. A feature of the device is a specially-designed parchment shade which gives an adequate, screened and diffused light.

Berry's Electric, Ltd.

This company is very prominently represented throughout the Fair buildings by means of its "Berrylite" signs, which act as guides to the many avenues, blocks, and offices. One of these signs is illustrated in fig. 18. Apart from this general display, the company has a stand measuring 70 ft. by 20 ft. (see p. 390), in the centre of which is a beautiful bungalow built of light steel, which has a red-tiled roof and is decorated on the outside in dark green. The outside of the bungalow is an arrangement of staggered fireplaces. Inside, the decoration is pale blue and gold, and there are 15 fireplaces each equipped with a "Magicoal" fire. Many designs are exhibited, and all of them are artistic and effective. The switchgear range shown includes a "Viking" board with a bronze finish which is a pleasant change from the practical black usually employed. Another attractively-finished board is equipped with "Masta"

Fig. 18.—A "Berrylite" Sign.

gear in white enamel with nickel relief. These prove that even plain engineering jobs can be made to look artistic. Another feature of the Berry display is the McClary cooker; this is also a handsome and efficient appliance. The company has recently established a factory to produce this cooker, which is of Canadian origin.

Avamore Engineering Co., Ltd.

Electrically-driven labour-saving machines for hotels and similar institutions are exhibited by this company. One of these is a dish-washing machine. In this the plates, &c., are placed in racks on a balanced platform and are lowered into the washing tank by means of a small hand-wheel. Here they are washed by a rush of water at high pressure. They are then raised and the rack is pushed along the platform, while another is put in its place. The platform is again lowered, the latest batch of plates goes into the washing compartment, while the washed plates are placed in a bath of steam or boiling water. The company also shows electrically-operated coffee grinders, potato peelers, and bread-cutting and buttering machines.

Gregson Manufacturing Co., Ltd.

This exhibit comprises a complete range of electric light fittings made in oak, mahogany, walnut, &c. It consists of hall lanterns, lounge, dining and drawing-room pendants and electroliers, table lamps, and floor standards, and many other fittings. A new range of silk shades for table lamps and floor standards is also on view.

Fair Facilities.

In a preface to the catalogue, the organisers of the Fair acknowledge the provision of apparatus and services by a number of firms. Among these is BERRY'S ELECTRIC, LTD., which provided the hundreds of "Berrylite" signs forming the guiding system inside and outside the buildings. The "Berrylite" sign is illustrated above. The overhead electric lighting in Building C, in which the greater part of the electrical exhibits are housed, was provided by the BRITISH THOMSON-HOUSTON CO., LTD. The METROPOLITAN-VICKERS ELECTRICAL CO., LTD., was responsible for the lighting and heating of the Royal dining room in Building C. The car park near the main entrance is illuminated by floodlighting apparatus supplied by the GENERAL ELECTRIC CO., LTD., while the car park near Building C has been similarly equipped by the BRITISH THOMSON-HOUSTON CO., LTD. Four 74-kW motor-generators were supplied by the ENGLISH ELECTRIC CO., LTD., and a number of "Greenbat" electric trucks for the moving of exhibitors' goods, &c., were made available by Messrs. W. GOODYEAR & SONS, LTD.

London Section.

As stated in our last issue, the feature of the electrical portion of the London Section of the Fair is the excellent collection of radio receiving sets and apparatus and accessories. Practically all the principal manufacturers are represented, so that it is impossible to refer to all at length.

Siemens Bros. & Co., Ltd.

This company shows a working model of its "No. 16" automatic telephone equipment (fig. 19) which enables the system to be readily demonstrated and the progress of a call observed. Exchanges of this type have been installed for the British Post Office in many provincial telephone areas, and several possess notable features. Large numbers of this type of exchange have also been installed abroad. The system operates on the step-by-step principle with a normal voltage of 60. Two types of switches are employed, "single motion" and "two motion," the former being called preselectors and the latter selectors. The interrupted battery current for driving the preselectors and the searching movement of the selectors is obtained by means of a separate motor-driven interrupter machine. An interesting feature of the model shown is the P.B.X. final selector which will search for a disengaged line in a group of up to 100 lines serving a P.B.X. The relays associated with the selector switches are self-contained units fitted with knife contacts which enable them to be immediately removed and a spare relay set substituted should they require attention. Each line is equipped with a meter for counting the number of calls originated, and these only operate when the call is successfully completed. The model is equipped with apparatus for four subscriber lines, and, in addition to the usual Post Office instruments, a selection of other types is shown, including some fitted with the hand-microtelephone.

An attractive table telephone is exhibited, large numbers of which are being used by many Colonial and foreign telephone administrations. An instrument generally similar, but fitted with a special 4-position switch, visual signal, and hand generator for extension working, is also shown.

The British Radio Corporation, Ltd.

Among several up-to-date five- and six-valve receiving sets is the "B.R.C. Radio Exchange," designed for use by those with no technical knowledge. By the simple movement of a switch any one of eight Continental stations can be brought in. The instrument embodies the company's h.f. unit, which is now being marketed separately; the unit comprises two of the latest type of screened valves and a detector. On view also is the B.R.C. screen-mounted valveholder and the H.F. combination neutralised transformer designed to work in conjunction with shielded four-electrode valves on wave-lengths between 200 and 2,000 metres.

Portable Receiving Sets.

Langham Radio shows its new "Langham Transportable" receiver for the first time; it is entirely self-contained, and is fitted with five valves, and a new type of tuner and indicator, and stands on a turn-table. The Langham "Transatlantic" portable set is also well represented, together with the "Pan" loud-speaker. Another of the many portable receiving sets on view is the five-valve "Halcyon" set shown by the Halcyon Wireless Co., Ltd. This is entirely self-contained and embraces four 2-volt valves, a power valve, and a "Celestion" loud-speaker. M.P.A. Wireless also displays some excellent designs of portable receivers, and cone-type loudspeakers, a feature of which is the spring mounting of the cone. The Portable Utilities Co., Ltd., shows a new five-valve receiving set weighing between 25 and 27 lb. The "Eureka Ortho-Dyne Five," as the set is known, is made in both cabinet and attaché case forms, the loudspeaker being neatly fitted on the cover. One of the lightest of the portable receiving sets is the "Real" shown by Read Radio, Ltd., which weighs from 21 to 24 lb. It is made in both four- and five-valve forms. Another interesting "Real" instrument is the self-contained home receiver with combined long and short-wave aerials and loudspeaker.

Another neat portable receiving set is that shown by Selectors, Ltd. It has five valves, and a Graham cone loudspeaker is used, together with a single dial control. The internal wiring embodies a fuse to guard against damage to the valves. In addition to four- and five-valve portable sets, the Truphonic Trading Co., Ltd., has on view what it terms a duplex set, which, in addition to the usual wireless reception, includes a "Celestion" pick-up and loudspeaker, so that gramophone music can be enjoyed when broadcasting is not available. Whittingham, Smith & Co. show the "Portadyne" five-valve, portable receiver and loudspeaker, a feature of which is that while accessibility of the valves and main components is retained, all the parts are concealed by a dust- and damage-proof cover.

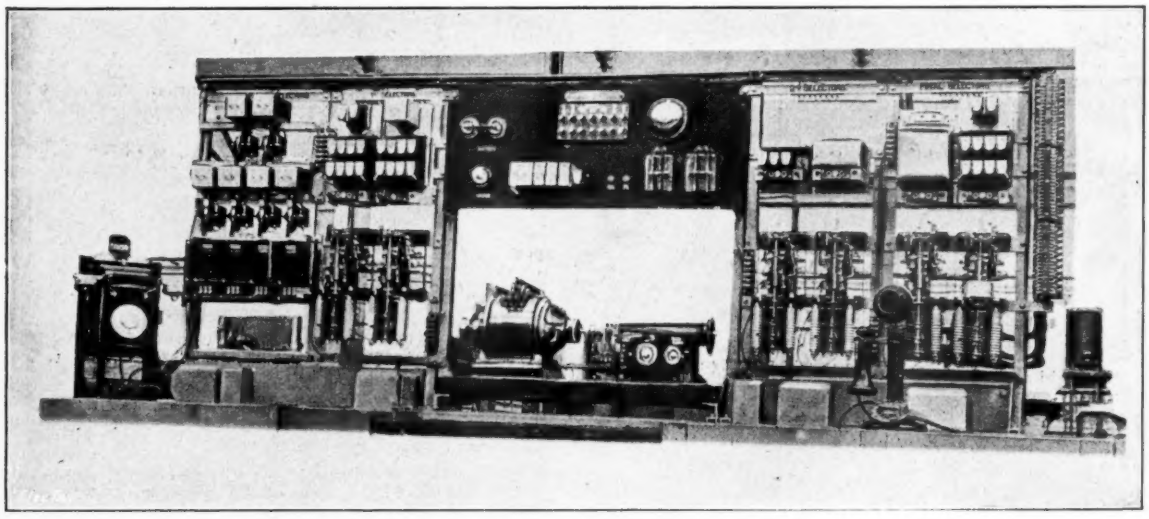


Fig. 19.—The Siemens Automatic Exchange.

All the telephones are fitted with the Siemens patent dial switch, which has been adopted by the General Post Office as standard. This dial switch incorporates the "minimum pause" feature which ensures a sufficient period of time for the switches to carry out their searching function before the impulses are transmitted.

The company's battery exhibit is divided into three sections. The first comprises complete Leclanché fluid cells and elements. The second embodies dry cells and batteries of standard sizes, including the "Inert" type. This section includes pocket, torch, and hand-lamp batteries. The wireless-battery section includes fluid Leclanché radio cells—both high and low tension—the former having a special unspillable and non-evaporating electrolyte. Among the dry batteries are special export types. There is also a revolving display stand illustrating the wide range of ebonite products made by the company.

Mullard Wireless Service Co., Ltd.

On this stand prominence is given to Mullard radio valves, including a new screened-grid valve for use in ordinary valve holders which is to be put on the market in the near future. A specimen of a Mullard transmitting valve taking 18 volts on the filament and 12,000 volts on the anode is also displayed, together with examples of the Mullard cone loudspeakers and the "P.M." l.t. and h.t. battery chargers designed for use in connection with a.c. circuits.

Gambrell Bros., Ltd.

In addition to inductance coils, condensers, indicating dials, wavemeters, &c., for radio use, Messrs. Gambrell are making a range of two-, three- and four-valve receiving cabinets, their latest introduction being sets designed to operate from the mains, the standard designs being adapted for 100-110 volt, d.c., and 100-110 and 200-240 V a.c.

J. Dyson & Co., Ltd.

This firm gives prominence to a range of "Godwinex" instruments for supplying the h.t. current for radio sets direct from the mains. Four different models are made, each being provided with a number of sockets so as to give a wide range of voltages. Messrs. Dyson also make an attractive portable five-valve receiving set; this is entirely self-contained and can be supplied with either horn or cone type loud speaker.

Selling Electrical Refrigerators.

The Fifth E.D.A. Conference.

THERE was a large attendance and a lively debate at the fifth E.D.A. Conference of the session, on February 17th. Mr. A. J. Fuller (borough electrical engineer, Fulham) presided, and the lecturer was Mr. A. G. Hill (refrigerator sales manager, Electrolux, Ltd.).

After stating that, apart from ice boxes, methods of refrigeration consisted of mechanical plants utilising the compression system and non-mechanical plants utilising the absorption system, Mr. HILL drew attention to the Public Health (Preservatives and Colouring Matter in Food) Regulations which came into force on January 1st, and the field thus made available for the use of electrical refrigeration plant in houses and small tradesmen's shops. Such had been the success in developing the smaller class of business, he said, that manufacturers had been able to reduce prices considerably. Thousands of pounds had been spent upon development work and the standard cabinets to-day with porcelain enamel linings satisfied alike the requirements of the medical man, the engineer, and the housewife. The speaker asked if the electrical industry had any use for a product which would further enhance its reputation for ready interest in the development of domestic labour-saving devices and conveniences; if it would welcome any possibility tending to level up the "peaks"; if it needed a theme for an effective publicity appeal; and if there was a field for increased trade activity and trading profit with its consequent effect of reduction of general and distribution costs. If those needs existed and were vital, he claimed that the answer to every one of them was to be found to a very considerable degree in furthering the sale of electrically-operated refrigeration appliances. He thought that electricity supply engineers could not afford to refuse to support a programme of refrigeration development. In this country there were manufacturers of refrigerators who had already done considerable development work and offered a perfect product to the public. In a number of instances they had a highly-trained selling force to approach the householder directly, which was both desirable and necessary.

The number of domestic and small trade refrigerators installed in 1927 was estimated at between 10,000 and 15,000, and it would appear justifiable to forecast that the annual installations will rise to within three or four times this number before 1930 with an ultimate reasonable maximum proportion of one to every three electrical consumers. At present the public was offered a standard range of moderately priced self-contained units suitable for average household use which were reliable, automatic, and economical in operation. Manufacturers realised that only by close co-operation with the electricity supply undertakings was it possible to achieve the maximum results. The propaganda work carried out by the manufacturers during the past two years had instilled into the public mind the idea of refrigeration as a possibility and even a necessity and to that extent the field had been partially prepared. Mr. Hill said that experience had shown that the extensive direct Press advertising which had been adopted by certain manufacturers had not, on the average, achieved results commensurate with those to be expected from a well planned campaign advertising a speciality product. The reason for this was the need for considerable preliminary work in educating the public into the "refrigeration idea," and in that direction the E.D.A. was doing exceedingly valuable work. For the same reason, direct mail publicity had not come up to expectations, and whilst for this class of product the direct personal call might not be desirable, there were a limited number of individual salesmen who obtained admirable and consistent results by this method. The greatest interest was likely to be created by the supply authority itself, an important factor being the continuous and close contact with the possible purchaser. The points to be made by any salesman were (1) saving of money and time, (2) safeguarding of health, (3) increased personal satisfaction and happiness induced by (*a*) pride of possession, (*b*) enjoyment of more leisure free from domestic duties, and (*c*) ability to provide with a variety of new attractive dishes and iced drinks. Most small tradesmen would now be compelled to install some type of refrigerating plant, and there were many suitable cabinets available at moderate prices.

Going into somewhat greater detail as regarded the mutual interest of the manufacturer and the supply authority, Mr. Hill said that the manufacturers so far had done a very fair share towards marketing electrical refrigeration plant and had maintained at their own expense a trained force of salesmen. They had attached individual salesmen to electricity undertakings which had offered collaboration; they had paid the salesman's commission, expenses, &c.; and, in addition, had given a generous net trading profit to the electrical undertakings. In certain cases additional discount had been given to undertakings wishing to use their own salesmen, but this precedent from a purely sales point of view was not to be recommended from the actual results obtained, owing to the fact that it was rarely possible for supply undertakings to allocate special men for the sale of refrigerators alone as was essential. Therefore, he asked the supply undertakings to accept assistance in this direction. It was possible, by a scheme of collaboration, to install in showrooms demonstration cabinets, and the importance of suitable showroom display could not be over-estimated. He also asked supply authorities to stimulate interest in refrigeration by electrical means by regularly mentioning it in letters to consumers; to enclose with quarterly accounts some publicity literature and to instruct the whole of their outside staff with general propaganda on the subject, and where possible offer them inducements to endeavour to arrange demonstration appointments at the showrooms. Electrical engineers who appreciated that the matter had passed the experimental stages should concentrate on giving detailed consideration, before the end of that month, to the particular type and make of electrical refrigerator which they thought was best adapted to meet their particular local requirements, and then to get into touch with the manufacturers with a view to arranging a definite collaboration policy for 1928.

Discussion.

The CHAIRMAN, opening the discussion, said that it was impossible for a supply authority to have a special salesman for refrigerators, and probably the best course was for one of the salesmen on the staff to get as much education as possible in refrigerators and then seek the assistance of the manufacturers when likely sales came along.

Mr. W. F .T. PINKNEY (Newcastle-upon-Tyne Electric Supply Co.) suggested that it was necessary to create a better feeling on the part of the public towards the easy purchase of the more expensive electrical appliances. The supply authorities could not keep special refrigerator salesmen and the manufacturers would have to help more and more in this respect.

Mr. G. BERG (Electrolux, Ltd.) said that the cost of running apparatus depended upon the time it was in use. Generally speaking a thermostatically-operated refrigerator of the domestic type consumed about 2 kWh per day. The mechanically-operated type always had a thermostat fitted whilst the non-mechanical type could be operated by thermometer or with a coldness regulator.

Mr. HONEY (Croydon) said that the gas and oil interests were also actively engaged in pushing refrigerating plants, and it was necessary for the electrical people to get these in first.

Mr. E. E. SHARP (Venner Time Switches, Ltd.) said that he did not agree that there was a demand for refrigeration from the householder at all, quite apart from the high price of apparatus.

Mr. RAYNER (Manchester) said that the real way to increase the sale of domestic refrigerating plant was the reduction of the price.

Mr. E. MORTON (Kelvinator, Ltd.) asked why the author had not mentioned the field for the much larger apparatus for tradesmen; there was such a wonderful field for refrigeration on its merits that it was unnecessary to bring in irrelevant arguments such as that refrigeration enabled one to buy in larger quantities.

Col. W. A. VIGNOLES (director and secretary E.D.A.) suggested that Mr. Sharp's views might alter after a hot summer, although, as a matter of fact, he apparently had a refrigerator in his larder. There must be some advantages in such refrigeration plants or else the manufacturers would not have spent so much money on their development or be ready to spend considerably more, as he knew they were. The main object of the conference was collaboration between manufacturers and supply authorities, but why should not the contractors be brought in as well? A scheme of direct selling between the manufacturer and the user might be satisfactory in some cases, but on the whole householders got a little impatient of so many representatives of manufacturers calling upon them, and better results were likely to be achieved if the work was done by the supply people and the contractors. In a certain block of flats in London a refrigerator had been installed in each flat, but the whole line was worked from one compressor in the basement. This showed that we were getting on.

Mr. BREWIS asked how the cost of direct selling compared with selling through supply authorities and contractors. His experience was that it was much cheaper.

Mr. HILL, replying to the discussion and questions, said that when speaking of collaboration with supply authorities he intended to include the electrical contractors. The point was, however, that manufacturers felt there must be speciality salesmen for this work and that development would be much slower if they were left out and ordinary salesmen took the work on as part of their normal duties. As to water supplies, the small refrigerators used five or six gallons per hour, but the Metropolitan Water Board made no extra charge. In the provinces in some cases a meter had to be put in and the water was charged for at a very small rate per thousand gallons. Hiring out had been considered by one or two supply authorities and certain proposals had been made by one manufacturer to assist the supply authorities in this respect. Refrigeration was certainly useful for fruiterers and even more so for florists.

The American Electrical Manufacturing Industry.

Federal Commission's Investigation.

THE Federal Trade Commission of the United States has published an illuminating report regarding competitive conditions in the country in the supply of electrical equipment. In view of the controversy which is proceeding in Great Britain just now between the electrical machinery manufacturers, as represented by the B.E.A.M.A., and certain electricity supply concerns, this report is of particular interest.

It seems that the three largest companies manufacturing in the United States prior to 1925 were the General Electric Company of New York, the Westinghouse Electric Manufacturing Company, and the Allis Chalmers Manufacturing Company, these being joined in that year by a fourth, namely, the American Brown-Boveri Electric Corporation.

One reason for the investigation of the Federal Trade Commission was a statement made in the Senate that the General Electric Company had acquired a monopolistic control over the manufacture, sale and distribution of electrical equipment and apparatus. The report now points out that the company has been for many years the largest maker of power plant, machinery and equipment in the United States. Its turnover increased from $16,000,000 in 1893 to nearly $327,000,000 in 1926, during which time its total investments rose from about $51,000,000 to $382,000,000, while its net earnings advanced from approximately $3,000,000 to a sum of over $59,000,000 in 1926, this sum being arrived at before the deduction of the Federal income tax. As to the ratio which the output of the G.E.C. bears to that of other companies, it is found that the value of the production of this large concern represented from 16 per cent. to slightly more than 20 per cent. of the total value in recent years. This percentage refers to all electrical machinery, apparatus and supplies made by the company. If, however, the more important units of power equipment only are taken, the G.E.C.'s proportion is larger, and represents from 46.9 per cent. to 51.6 per cent. of the value of all generators; from 52.2 per cent. to 58.3 per cent. of the transformers; from 34.2 per cent. to 42 per cent. of the motors; and from 32 per cent. to 45.1 per cent. of the control apparatus.

High Level of Profits.

The profit results revealed are of exceptional interest. During the five-year period, 1922-1926, the rate of profit of the General Electric Co, before deducting Federal income taxes, ranged from 11.2 per cent. to 16.2 per cent. Considering only the earnings on its investment in the electrical manufacturing business (*i.e.*, excluding outside investments), the rates of return during the same period ranged from 14.3 per cent. to 22.8 per cent. The profits of other electrical companies were not obtained for this period, but for 1924 financial reports were received from 79 companies engaged to a greater or less extent in the manufacture of goods used by the electric power industry. The average rate of return for these companies (which had an aggregate total investment of about $490,000,000) was 9.6 per cent. in 1924, as compared with 15.1 per cent. for the General Electric Co., though some of these companies, individually, had higher rates of return than the General Electric Co.

On the subject of competitive conditions in the manufacture and distribution of electric power equipment, the Federal Trade Commission's investigation was limited to machinery and apparatus essential to the production and distribution of electrical energy, namely, generators, transformers, motors, switches and switchgear, station equipment and line materials. It is pointed out that prior to 1925 the manufacture of such equipment was carried on partly by the three large companies mentioned above, generally known as "full-line" companies, manufacturing practically all kinds of power equipment, and partly by a large number of smaller "short-line" companies confining their production in some cases to a single kind of equipment. The prices of these large companies are regarded in the trade as maximum levels above which the other comparatively small manufacturers generally cannot hope to sell.

Dominating Factors.

It is also the general belief among these comparatively small manufacturers that the large companies compete actively in price, quality and service. Some small manufacturers stated that although the large companies undoubtedly have the power to crush them by price competition, this power has not been used in recent years. It was stated, however, by certain small manufacturers of fractional horse-power motors that in recent years prices have been reduced to levels at which they have been unable to compete. Many small manufacturers, on the other hand, stated that the small companies rather than the very large ones are their sharpest price competitors. The general opinion among the many small manufacturers called upon was that the General Electric and Westinghouse companies dominate the trade chiefly because of their financial resources, country-wide distribution and service organisations, and control of many of the largest wholesalers. The elements in the competition of the large companies that are most difficult for the small manufacturers to meet are the lump-sum bid, the quantity discount, and the consignment of motors. There was some complaint of oppressive patent litigation, but no substantial evidence has been obtained on this point.

The Repeat Order.

With regard to the prevalence of repeat orders, it is stated that preference for the equipment of one manufacturer over that of another, because of previous installations, plays an important part in the purchasing of some power interests, but, in general, power companies secure competitive bids and appear to purchase their equipment from the lowest bidder, other conditions as to guaranteed efficiencies, times of delivery, &c., being satisfactory. Some large power groups distribute their purchases among different manufacturers for the specific purpose of maintaining competition.

There is a highly significant reference to the practice of exchange of patents between American and foreign concerns and the influence which this system exercises on international competition. The General Electric and Westinghouse companies, it is said, through their research organisations, have been leaders in developing patents, technical information and manufacturing experience in the nature of trade secrets that are of value to companies in foreign countries. Foreign companies likewise have patents and information valuable to companies in America. The result is that these two large American companies have severally entered into contracts with numerous large electrical manufacturing interests in the principal foreign industrial countries. By these contracts each party, among other things, makes the other its exclusive licensee under its patents in a specified territory. Thus these two large American companies have obtained the American rights under the foreign patents of many of the most important foreign companies. These rights may be used or withheld from use as the big companies see fit, as no other American manufacturer can obtain the rights without the consent of their American holders. Thus potential competition, both of the foreign companies and of other American manufacturers who might otherwise obtain rights under the foreign patents, is eliminated.

Trade Associations.

Finally, the following account is given of the associations which have been formed in the power supply and manufacturing industries:—

The power industry has a large and very active trade organisation, the National Electric Light Association, which in 1926 included in its nine classes of membership 15,820 of the leading power operating and holding companies, manufacturers of electric power equipment, engineers, scientists, and others interested in the development of the power industry. The object of the association, as set forth in its constitution, is to advance the art and science of the production, distribution and use of electric energy, largely through educational methods. The Association's activities may be classed under three general heads: (1) compilation and dissemination of technical and other information; (2) co-operation with other organised groups of manufacturers, dealers, engineers, scientists, financial interests, underwriters and with State and Federal governmental agencies in the consideration of matters affecting the power industry, either directly or indirectly; and (3) educational activities intended to create public good will for the industry as at present conducted under private ownership subject to public regulation. Through its extensive divisional and committee organisation, co-operation with technical, trade, financial, governmental and other organisations, and through its contacts with the Press and other agencies for the moulding of public opinion the association undertakes many lines of activity that are unusual in trade association programmes, and until quite recently, at least, it has sometimes been lacking in frankness towards the public.

There were formerly two manufacturers' trade associations and one manufacturers' social organisation federated under what was known as the Electrical Manufacturers' Council, which in 1927 were consolidated under the name of the Electrical Manufacturers' Association. The Council exercised an unusual amount of control over the activities of its constituent associations in applying the rule that all acts or proposed activities should be subject to review by the Council's legal committee and its employed counsel. In this way the Council was apparently alert in keeping the manufacturers' association activities in line with the requirements of the anti-trust laws.

Modern Electric Wiring.

A constructive criticism of the systems and methods of wiring in vogue, with suggestions calculated to help in the work of spreading the use of domestic electricity.

By DONALD SMEATON MUNRO, M.I.E.E.

(*Abstract of a paper read before the* Institution of Electrical Engineers.)

(*Concluded from page 354.*)

MANY erectors do not give sufficient attention to the question of the lengths of conduits. If, for instance, we are considering repetitive work, as in a housing scheme, much waste of time and material can be avoided by delivering bundles cut beforehand to special sizes. It is undesirable to employ screwed bends for conduits below the ¾-in. size. Better and quicker work can be done without them. Occasionally, however, with the larger sizes, it is advantageous to make templates and have certain conduit lengths set by the makers.

The careful and correct making of cable joints was at one time considered a most important part of the training of a wireman. It is so still; yet there are, no doubt, many modern apprentices who have completed their entire training period without having made one interlaced soldered and insulated joint. There is no room for joints in the boxes common to lead-covered or compound-insulation systems, and with conduit work the prevalence of looping has led to a more general adoption of screw connectors. For the best modern conduit work there are many, however, who still prefer the soldered joint. It necessarily differs from the older forms of T- or star-shaped joint which radiated from a centre on one plane. For soldering joints there is still no flux on the market so safe and suitable as resin. Among the connector boxes supplied for the lighter systems of wiring there are several made of hard compound insulating material which have connector terminals embodied in their composition; or, if of metal, they contain a china ring base having terminal blocks thereon. In such boxes it has been found that four such terminal blocks meet most of the ordinary circuit requirements.

It is not always fully appreciated when selecting switches that the conditions in house lighting differ from, say, motor control in a workshop, although the voltage and the maximum amperage may be the same in both situations. The switches for both should be, to a certain extent, foolproof, but in the workshop the switch may have to make and break a circuit many times a day, whereas in a house several years may elapse between operations A switch having efficient quick make-and-break arrangements largely dependent on light steel springs may prove efficient in a workshop and give due warning as it gradually approaches the defective state. In domestic conditions it is not uncommon to find the springs corroded, clogged and ineffective, and the blades jammed in their contacts A positive action on the switch handle is, therefore, especially necessary in a house main switch, and robust blades and sockets are more important than springs.

When two or three circuits are called for, it is usual to fit external pairs of small ironclad porcelain bridge-type single-pole cut-outs mounted on the same wood back board as the main switch. When this arrangement is indicated, it is often better to use double-pole cut-outs, each pair being enclosed in a cast-iron case. This avoids exposed crossings of circuit wires. There is, in the author's opinion, room for a range of simple robust, ironclad double-pole switches of the 15-, 30-, and 60-ampere sizes, the cases in each class containing three or four sets of double-pole cut-outs of appropriate size.

The use of the d.p. coupled tumbler switches should now be forbidden. It is rarely set with the proper accuracy on its wood base, so that the switch contacts may be defective from the time of erection, and it is too liable to degenerate into a single-pole switch.

Where separate d.p. fuse-boards are used in houses, the great majority are in wood cases, and in better-class work the conduits terminate in the sides of an iron box fitted behind the fuse-board. This arrangement is good in a house where all the fuse-board surroundings are dry and insulated, but with the general tendency to use Home Office fuse carriers everywhere, the ironclad patterns of fuse-board are being increasingly employed and save time in erection. The iron-box fuse case designed for general adoption in small house work should be suitable for surface mounting, but it would be an advantage also if it were adapted for neat recessing into the wall for a depth of, say, 1½ in.

Before the H.O. patterns of fuse carrier came, one could tell by a glance at the fuse-board which fuse had blown; now that the actual wire is concealed, it is necessary to consult a circuit list, or withdraw the fuse bridges one by one. This defect in the H.O. fuse carrier may ultimately drive us to adopt the indicating cartridge type of cut-out. Short-circuit values of several thousand amperes are easily attained on house circuits under modern conditions of supply, and although the I.E.E. wiring regulations specify that a 10-A ordinary-duty fuse carrier is only to be used when the maximum short-circuit current cannot exceed 1,000 A, the installation engineer is not in a position to determine this figure.

In reports of faults and accidents one occasionally reads that the lights were controlled by an ordinary 5-A switch, but those who have much to do with installation work know that there is no such thing as an ordinary 5-A switch. In Britain we have never wholly taken to the double-push switch as used in America, or to the rotary china switch which is so common on the Continent. The accepted and typically British type is of circular pattern and is actuated by a dolly handle. Originally these switches had a deep fluted metal cover. For some 10 years, however, a brass cover of less projection has been favoured. Such surface patterns are mounted on a solid or a recessed block or fibre lid, or are directly screwed to an iron box. The semi-flush patterns have shaped china bases which recess neatly into their iron boxes or wood back-blocks. The sunk or flush pattern may have a similar switch action to the two patterns mentioned, but is designed for fixing in a box which is covered in on the face by a plate of some kind.

Branch switches mounted on the same china base with sockets have attained popularity. They are supplied in 3-, 5-, 10-, and 15-ampere sizes and arranged for the front or side entry of their 2- or 3-pin plugs. They have the advantage over the original separate switches and sockets in that they are more compact, are simple to fix and, as they reduce the number of wire contacts, are less liable to overheat. It might be a convenience if the front-entry type had the face of its socket raised to the same plane as the top of the screw thread which holds on the cover; then the combined switch and socket could be readily used for sunk positions when required. But this would have the demerit of slightly increased projection of the plug top when the switch socket was used for surface work.

Flexible cords for portable apparatus, when attached to the common 2-pin plug controlled by a single-pole switch, are liable to be alive relative to earth, whether the switch is "on" or "off," and for this reason, in addition to its increased circuit-breaking capacity, it is better to employ the double-pole pattern of branch switch or combined switch socket. In the author's opinion all portable heaters or cooking appliances should be controlled by double-pole switches and 3-pin plugs. Such switches, when of the tumbler type, should be provided with an insulated cover or a cover lined with insulating material. The branch switches above the 5-ampere size for domestic purposes are usually of the 10- or 15-ampere size, and are sometimes fitted with long, parallel dolly handles convenient for foot operation. Very useful and reliable rotary-action switches are also much in demand for heaters. A new variant of this rotary switch, made in black and fitted with an indicating white handle which turns right or left, is now popular for cooking stoves and gives good service in such positions where free from the risks incident to the moving of furniture.

The primary purposes of a switch box are to protect the switch from dust, moisture and *débris*, to maintain continuity and provide good mechanical support for the switch and its cover plate. A deeper box is required if the conduits or other cable conveyors are run behind lathing than is the case when the switches are on a plastered brick or stone wall. As several conduits may radiate from the top, bottom, sides or back of a switch box, room for lock nuts must in some cases be provided and space for cable ends be retained. When the exact requirements can be foretold, there may be advantage in receiving from the makers boxes containing switches, sockets, &c., mounted complete in their boxes. One is reasonably sure, then, that all the fixing holes are tapped and screws provided.

It is not often realised how difficult a task the wireman has in arranging and adjusting the depth of branch switches and seeking for minute screw holes in the back recesses of a box which is blocked by cable ends. It is not uncommon to require switches of various depths in one box.

Journeymen should be able to rely in future on the assistance of electrical energy during all building operations—even in housing schemes. Temporary connections supplied at an arranged rate, perhaps through a master meter, hasten the work in daylight, permit of progress in the dark morning hours, and serve to advertise the various firms concerned at night. Every "Rawlplug" hole, partition-piercing and chase in a wall or joist could with advantage be made with an electric tool. Flexible shafts on portable tools are not very satisfactory and, even if they are less troublesome, they have the drawback of placing the tool operator too far from his

control. Where there are many wall channels or numerous joists to groove, it is probable that more use will be made than hitherto of electric grinders or cutters. These, with their small motors, could readily be made with two bearings fitting spring-tight on a stout length of conduit. The conduit would be clamped between the floor and ceiling or wall and wall as required, and set parallel to the wall, floor or ceiling. The tool would cut the groove to the pre-arranged depth as it was pushed along the conduit.

It is odd, in view of the importance of artificial lighting, that architects as a rule make no preparation for its installation. It is a commonplace occurrence to find black meters, green service switches and cut-outs, and straggling coiled cable-ends applied haphazard on the otherwise unsullied surface of the vestibules or lobbies of small houses. It would not be difficult to provide a suitable recess for these inevitable but unsymmetrical fixtures in the modern home. In the old-fashioned house one did not find the gas meter at the door.

The selection of conduit sizes and paths, choice of the proper dimensions and best disposition of junction and draw boxes, are most important factors in the planning of branch wiring. Even in small houses there is much scope for the selection of alternative methods. Consistent looping to lights and switches is specified by many consultants and architects, who appear to have an exaggerated opinion of the merits of the method. The practice may reduce the number of junctions in concealed boxes, but it adds to the number of important junctions which are partially exposed to the atmosphere. The difficulty of tracing faults also is increased by looping. The intelligent use of 3-plate ceiling roses and third-terminal switches materially economises in cable while retaining the apparent advantage of looping, which is primarily a means of providing easy access to cable ends.

In practice it is not difficult to decide on sound circuit arrangements on normal lines for all-electric houses of four rooms and under. For houses of 8 to 10 rooms and larger there may be difficulties introduced by the need of balancing the supply, and a complete set of heating sockets demands many circuits if we keep strictly to central fuse-board distribution. In many cases a common ring supply for seven or eight outlet points which are at present supplied by individual 7/.029 cables could be efficiently served by a much shorter length of 7/.044 cable.

Many are of the opinion that the first cost of an installation is the chief deterrent to the rapid spread of electrical demand, and the popularity of so-called free-wiring and hire-purchase schemes supports this view. But as the public grows to realise the extent of the services of electricity, the barrier of initial cost will become less important. Cheap and meagre installations are inelastic and remain comparatively unfruitful to the electrical industry during the few years they last. In houses which range in price from £2,000 down to £300

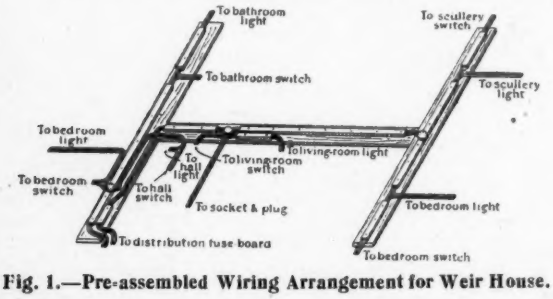


Fig. 1.—Pre-assembled Wiring Arrangement for Weir House.

it would be fair to estimate that the proper cost of wiring varies from 5 to 10 per cent. of the building value, according to the heating and other facilities provided.

As an example of legitimate minimum costs for wiring work, it would be difficult to beat the arrangements as standardised for one of the types of Weir steel house. It was decided to cut down as far as possible the amount of electrical work to be done on site, and to arrange a method whereby practically all wiring work would leave the factory as nearly complete as possible. As earthing points are everywhere available in a steel house, an insulated system was indicated. Maconite cable was adopted; this was measured and cut in the factory and fixed on straps of wood about 16 ft. × 4½ in. × ¾ in. by means of wooden buttons. These straps, when in position, formed the "H" arrangement shown in fig. 1. Suitable joint or junction boxes were fixed on the straps, and cables were connected as shown. The loose ends of the cables intended for ceiling points, switch points and socket points were coiled and fixed with cord to the straps. The transport of these straps, completely wired, was a simple matter, and all that was required of the electrician on site was about two hours' time for connecting the various accessories. The total cost of the material, which included: Main switch and cut-outs; 2-way distribution fuseboard; 50-ft. wood strap, 4½ in. × ¾ in.; 100 yards 3/.029 tough-rubber cable, single-core; 3 junction boxes, 6 ceiling roses; 6 cord-grip lampholders; five 5-amp. tumbler switches; one 5-amp. socket and plug; wood capping for cable, screws and nails; and recessed blocks for switches and screws, amounted to £3 13s. 7d. The labour costs involved in fixing the cable by means of wood capping on the straps at the factory amounted to 4s. 6d. (two hours at 2s. 3d. per hour), and fixing the straps in position on site and connecting up also amounted to 4s. 6d., making a total of 9s.

Many corporations have become lax in making tests or examinations even of new installations. In any case, now that municipalities and supply undertakings install wiring in competition with private firms, it is most desirable that the inspecting authority should be neutral. Almost the only safeguard the public has in the meantime is the employment of contractors on the National Register, who in turn retain a trained staff. The author would welcome the formation of a body of trained and certified wiring inspectors with powers to visit, test and inspect old as well as new installations. Their reports would in time help to unify approved methods of wiring. The insurance companies, combined with the Institution of Electrical Engineers and the National Register of Installation Contractors could, with advantage, found, train and control such an independent body. Inspectors acting with authority would improve the wiring industry and further the adoption of national rather than local rules.

Electricity Supply in Glasgow.

The Manager's Statement, and the Corporation's Decision.

MR. R. B. MITCHELL, manager of the Glasgow Corporation Electricity Department, on February 22nd issued his reply to the report of the Special Committee on the administration of the Department. He confined himself to that aspect of the charges which affected the department. Having pointed out that certain matters referred to in the report belonged to a period before his appointment, Mr. Mitchell dealt with the allegation of "Unauthorised Expenditure." This, he stated, was a very serious charge which he emphatically declared to be unjustified. He wished to make it quite clear that no expenditure of even comparatively small amounts was at any time incurred without the knowledge and approval of the Committee. Further, all expenditure was noted to the Works and Finance Committee at its fortnightly meetings; certificates authorising payments to contractors were signed by one member of each Committee; contracts for materials, cables, meters, &c., were annually made by the Electricity Committee, and the quantities used as necessity arose. In all these matters there had been no departure from the practice obtaining before the date of his appointment. With regard to the suggestion that the Committee had no means of checking the accounts, Mr. Mitchell drew attention to the fact that an application was made by the Electricity Committee to the Electricity Commissioners in 1925 for sanction to borrow £2,000,000, and that this was granted to the extent of £1,850,000. Statements at that time were made up for the information and guidance of the Electricity Committee, and, after approval, were forwarded to the Electricity Commissioners, showing how that amount was made up, and how the moneys were to be applied.

It was true that there were only two generating stations—Port Dundas and Dalmarnock—but the point was ignored that all the others, with the exception of St. Andrews Cross, were acquired by the city in the course of various annexations. They had long since been closed down on account of their relative inefficiencies. The written-down capital value of Dalmarnock station at the present time was about £14 per kW; the highest authority could be produced that the average present-day cost of such a station was between £14 and £15 per kW, and not £11, as stated in the Committee's report. Evidence of high authority supported his view that the extension to Dalmarnock authorised in 1923 was justified. He was satisfied that his opinion would be confirmed by experts that the estimated capital expenditure for mains extensions was not excessive, while confirmation could be readily obtained by a comparison with other large cities. With regard to the criticisms *re* the "Welfare" expenditure, the "Welfare" scheme was a matter really in the hands of the Corporation; he thought, however, that it was a very desirable thing, calculated to improve the morale of the department.

Dealing with the point regarding the acquisition of 31 acres of land, Mr. Mitchell pointed out that this was done before his appointment, and that it was the intention to fill up the low-lying part with ashes from Dalmarnock and so render the ground suitable and desirable for an electrochemical or other such factory requiring a large and cheap supply of electrical energy. The cost worked out at 1s. 5d. per ton of ash; about 40 per cent. only of the ground was suitable for making up, and if the cost of that area only was set against the ashes the cost then became 7d. per ton.

Dealing with the question of the alteration of the system of supply from d.c. to a.c., he pointed out that the first low-pressure a.c. supply to any area in Glasgow was provided for the Riddrie housing scheme in 1922, while further a.c. supplies were provided shortly after for Greenhead, Drumoyne,

Craigton and Mosspark. The cost of a.c. distribution for these out-lying areas, as compared with d.c., was so greatly in favour of a.c. that this system was unhesitatingly adopted from the points of view of efficiency, economy, and flexibility. The cost of cable-laying alone in these schemes and on a.c. distribution throughout the city to-day was 30 per cent. less than with the d.c. system.

Mr. Mitchell agreed that in three instances tenders for coal were amended in a downward direction, but claimed that that was done in the interests of the community, whereby £141 was saved. He preferred not to have the responsibility thrown upon him alone of dealing with tenderers, and he suggested that a small sub-committee be appointed so as to ensure that all matters were done formally, and to avoid any suspicion of unfair dealing.

In regard to the stock of cables carried by the department, the manager pointed out that the Investigating Committee did not seem to appreciate that cables which were obsolete for new work still had to be kept for spares or repair work on old cables, and he suggested that the inventory of the stock was made also at the time when the supply was at the maximum, pending the laying of cables during the summer months.

In conclusion, the manager pointed out that the capital outlay of £5,918,848 for the last nine years included much of the original cost of erecting and equipping Dalmarnock station, and that the output and revenue had increased in greater proportion than the capital expended. He anticipated that, with the satisfactory increase in output which had been experienced during the present financial year, and the reduced cost of fuel, the department would at May 31st next, be able to meet all liabilities and actually show a surplus on this year's working. He contended that the Electricity Department under his charge was to-day in a thoroughly sound condition, both from the point of view of engineering and of finance. The department had at present 75,000 consumers, and this number was being increased at the rate of 7,000 per annum. The new business connected amounted in 1926-27 to approximately 22,000 kW. The department was giving a continuous supply to all consumers at rates which compared favourably with those of any other municipal or company undertaking.

Glasgow Corporation, on Friday (February 24th) discussed the report of the Special Sub-Committee on the Working of the Electricity Department, which it adopted by 63 votes to 26. By 43 votes to 42 it was agreed that the manager be asked to resign and that the department be reorganised. These decisions were come to after prolonged discussion lasting over three hours. Bailie Higgins, convener of the Electricity Committee, moved the adoption of the report. For a period of over four months, he pointed out, the Sub-Committee met twice a week and spent two hours each day on the business. Every possible witness who the Committee thought might be of value was invited to give evidence, and a verbatim report of the proceedings was taken. It should be recognised, he emphasised, that the Electricity Committee was not forced into this investigation, but it recognised in the course of its work that there were things which deserved inquiry. The manager indicated that he welcomed the inquiry, and the Committee did everything possible to get all information. As one of the oldest members of the Electricity Committee, Mr. Morton said he had had the highest respect for Mr. Mitchell (the manager), but he complained that the work had been carried on largely by Mr. Mitchell without consulting his Committee. Moving that the report be not accepted, Mr. W. B. Smith said that many of the facts did not seem to be quite accurate, and the conclusions seemed to be wrong. He criticised the allegations that there was too much plant at Dalmarnock, and as to high costs, and said that when it was completed and fully equipped the figure for the station would only be 17s. 6d. higher than what was stated by the Commissioners for a model station. Other speakers complained that an undue opposition was shown to the manager. Mr. Holmes, the member who moved for the inquiry, referred to the purchase of ground at Dalmarnock for an ash coup as a bad speculation. Referring to the change from direct to alternating current, Mr. Holmes said the minute dealing with the matter sanctioned several comparatively small extensions, so that he was astonished to find that for the year ending 1927 the amount spent in this connection was £100,000. "As a magistrate," declared Bailie Munro, "I have never at any time allowed any evidence to be led unless the alleged culprit was in the dock to hear both sides." He complained that the Committee kept Mr. Mitchell sitting in the corridor like a man for whom they had no other use. He protested strongly against this as being grossly unfair. Mr. Dollan, who wanted the report and the manager's statement remitted back for further consideration, also drew attention to the treatment meted out to Mr. Mitchell, remarking that the whole atmosphere was poisoned against him. Another amendment, to call in an outside expert, only received three votes. It should be noted that the decision that the department should be reorganised and the manager asked to resign was reached by a majority of one vote on a show of hands. The method of taking the vote on such a momentous question has created great dissatisfaction, and it is contended that a vote by roll-call ought to have been taken. Future developments are awaited with intense interest, as it is contended on all hands that the matter cannot be allowed to rest where it is.

Correspondence.

Correspondents should forward their communications **as early as possible.** *No letter can be published unless we have the writer's name and address in our possession.*

The Sale of Fittings by Local Authorities.

As doubtless you are already aware, this Committee was appointed by the Electricity Commission under Section 48 of the Electricity (Supply) Act, 1926. It has held a few preliminary meetings to settle procedure, and the time now appears opportune for informing the technical papers, and, through them, all interested parties, as to its chief functions.

1. Briefly, then, the Section (called the "Sale of Fittings" Section) empowers joint electricity authorities and local authorities to *sell* "fittings," which term includes "electric lines, apparatus, and appliances for lighting, heating, and motive power, and for all other purposes for which electricity can or may be used." In addition, such authorities are empowered to "install, connect, repair, maintain, and remove" such fittings, and to charge for doing so.

One of the questions with which the Committee will doubtless have to deal, as soon as a case arises, is: What is a "fitting," for the purpose of the Section?

2. Secondly, an authority must not manufacture fittings unless expressly authorised to do so by special Act or Order.

3. Thirdly, sales can be made only to a consumer on the authority's mains or to a contractor who requires the goods for re-sale to a consumer on the authority's mains.

4. Next comes the matter of price, which furnishes the Committee with its chief function.

The price to be charged by the authority to a consumer is not to be less than the "recognised" retail price, and to a contractor not less than the "recognised" trade price; and as to what is "recognised"—the Committee is here to determine.

5. Lastly, the Committee is invested with the duty of generally advising and assisting all persons concerned as to the method of giving effect to the Section; and I am empowered, as its chairman, to inform all such persons that it will be very pleased to hear from them in that or in any other before-mentioned connection.

D. N. Dunlop,
Chairman of the Committee.

London, *February 23rd*, 1928.

Insulation Impregnation.

I was greatly interested in the article by Mr. A. C. Dunlap on "Insulation Impregnation" in your issue of February 17th, with much of which I am in entire agreement, but some statements in the article are a little misleading.

Mr. Dunlap has not made it clear, in that article, that in the class of apparatus he wrote about the drying of the articles treated takes place under vacuum, and that it is pressure which causes the varnish or compound used to saturate the conductor coverings and penetrate between the windings of the wire.

In the case of some apparatus, notably the early plants made in Germany and France, the pressure of the atmosphere was, and is, relied on to cause penetration, and that was often insufficient for the purpose. In other apparatus the pressure above atmosphere, in addition to atmospheric pressure, causes the varnish or compound to penetrate the windings and saturate the coverings.

The writer was the originator of the process of "vacuum drying and pressure impregnation," designed the apparatus, and put it on the market. That business is now carried on by "Browns' Dryers, Limited," of Manchester. Many of the earlier plants were supplied on the Continent, where they and the system were largely copied after the original patents had expired.

Since the first apparatus was put on the market many improvements have been made on it which have not yet been copied. There is, therefore, no need to go abroad for apparatus of this character, as the old style, and also the improved plants, can be obtained in England. The present electric-oil-heated apparatus is far in advance of the earlier impregnators, although a large number of those were sold, and are still in use; but they do not compare in convenience, economy, or safety with the present apparatus, in which temperatures up to 500 deg. or 550 deg. Fahr. can be readily attained without any pressure whatever on the heating medium, or any danger of fire, while the cost of operation is often considerably below the cost of steam heating.

An incidental statement in the article mentioned, with reference to the penetration of wood, also needs a little explanation. The pressure required depends on the kind of wood treated and the thickness of the wood to be penetrated. Some woods are much easier to penetrate than others, but as the wood is usually of much greater thickness than the covering of the wires a greater pressure is required to ensure penetration of the varnish. If the wood is to be dyed only, then care must be taken to select a dye that will penetrate without being filtered out of its carrier, or solvent.

An important point that was not touched upon is the heating of the articles to be dried and impregnated. Neither perfect drying nor impregnation will ensue unless the articles

are thoroughly heated first. The articles may be heated in the impregnator, but that usually takes a long time to ensure good results, and it is not good practice to waste the time of the impregnator when the preliminary heating can be carried out better in an oven that costs far less money, leaving the impregnator free for the work for which it is specially designed.

Another important point that should be emphasised is the quality, as it may be called, of the vacuum to which the articles are subjected when being dried for impregnation. The highest vacuum possible, under ordinary commercial conditions, does not remove all the air from the impregnator. There is always a slight amount left which may be imprisoned, by the varnish, in the article being impregnated, unless special precautions are taken. To eliminate as much risk as possible from that cause a vacuum of 29 in. to 29½ in. (with the barometer at 30 in.) should be produced in the impregnator when the articles are being dried, to reduce the liability of imprisoning any air in the windings.

The important matter of ascertaining when the articles in the vacuum chamber are absolutely free from moisture is now solved. Previous to our placing a humidity gauge on the market, it was a matter of guesswork—sometimes called judgment. If the attendant's judgment led him to subject the articles to vacuum for a long enough period, the results were good, otherwise not, and in many cases there was a great deal of trouble afterwards due to moisture being imprisoned by the varnish and damaging the insulation.

We have now a humidity gauge which can be relied upon to show, under vacuum, when all of the moisture has been drawn off from the articles in the impregnator. It is then safe to flood them with the impregnating varnish, or compound, and apply pressure to cause saturation of the covering and penetration of the windings.

With regard to drying after impregnation, if solid compound is used no drying is required, and the articles merely need to cool to become a solid mass. For varnish impregnation, the writer patented, many years ago, the introduction of oxygen in connection with certain varnishes and the introduction of nitrogen in other cases, but both of these patents were allowed to lapse, as it was found that good results could be obtained in other ways. Good insulating varnishes of the non-synthetic type dry by absorption of oxygen, and in doing so increase both in bulk and weight, so that the article is usually slightly heavier when dry. It will, therefore, be found advantageous with that class of varnish to expose the articles to heated air. The oven in which the preliminary heating is carried out can usually be utilised for this purpose also. This does not apply to the synthetic varnishes, which have to be treated in other ways after impregnation, according to the composition of the material.

So far as filling the spaces between the turns in the winding is concerned, this is difficult when using ordinary oil varnishes. It can be done with compound, or with some synthetic varnishes. On the other hand, if the varnish is a good one and impregnation has been carefully carried out according to instructions, a single operation will, in almost all cases, answer every purpose, as in that case no air or moisture will be imprisoned in contact with the wire, and a film of varnish will so thoroughly coat the wire that no action can take place; it is only when this film is not complete, or when it is disturbed afterwards, that a breakdown occurs. That is one of the reasons for impregnating the apparatus after it is all complete, as then no disturbance of the insulation will take place, and no damage will occur. A second reason, very important to the manufacturer, is that it is cheaper to do the work in one or two pieces than in many.

A. G. Brown.

Manchester, *February 21st*, 1928.

Charges for Electricity in the London Area.

As the result of a much overdue protest the world has been informed that an inquiry has been ordered to consider the charges for electricity in the London area. It would appear, according to the scale of charges before me, that a charge of 8d. per unit is permissible at present. One can easily recall that during the war the Government endeavoured to help the people by fixing the maximum price for certain commodities, with the result that these prices were immediately acted upon as being the minimum—the cost of production being altogether ignored. Now, although the maximum price of 8d. per unit is not generally insisted upon, there is much evidence to show that there is great reluctance to depart from the spirit produced by the atmosphere created by the war. Where then is the principal cause of complaint? Is it in the area supplied by the local authority or in the area supplied by the private company? Go through any of the principal streets in the shopping areas of the suburbs, and where gas predominates as the artificial illuminant you will not be very far from the area of a supply company. It is not because gas is the best illuminant. We very often hear that it is repugnant to Britishers to be controlled—yet not only are we controlled right and left, but we go on asking for more of it, and, having acquired it, it is there for keeps. "Dora" is a witness to that.

Let me venture to suggest that electricity supply is not a question for huge dividends and vast capital appreciation—it is rather a question of service. Let the supply authorities, public and private, realise that every house and shop is a potential consumer of electricity, and then there will be no need for haggling over terms. One may suppose that the reply to this statement will be the usual one of rate-aided undertakings having the advantage; but it will bear investigation to assert that many municipal undertakings are not rate-aided—quite the reverse, in fact. The question of municipal trading *v.* private enterprise is a thorny one—the comparison in results cannot be better exemplified than that obtaining in electricity supply, and it is up to the great supply companies to get busy and solidify the fact that "Electricity saves more than it costs."

Wm. G. Brown.

London, *February 25th*, 1928.

Merchandise Marks Act Inquiry.

With reference to your report on page 305 of the issue of the Electrical Review for February 17th, 1928, we shall be much obliged if you will allow us to state that in the course of the manufacture of our "Maxim" lamps we, like other lamp-makers in this country, are obliged to use certain materials coming from the Continent, but the greater portion of the cost of "Maxim" lamps is made up in the employment of British labour at our works here in London, plus the value of British materials used.

We are therefore perfectly justified in claiming our lamps to be British made, and no lamp is sold by us which has not been manufactured in our works.

Poynter, Griffiths & Co., Ltd.
(J. F. Poynter, *Managing Director.*)

London, *February 24th*, 1928.

The Overhead Lines Association.

In your issue of February 17th you give particulars of various suggestions made for submission to the Electricity Commissioners.

In connection with the height of poles there seems to be an omission. Along and across rural roads the height is given as 17 ft., and across public main roads 18 ft., but there is no height given for wires run *along* main roads.

There are now, and will be in the future, many overhead distribution lines running along main roads where they pass through villages and small towns, and it is necessary to make clear what height these are to be.

J. A. Morton.

Huyton, *February 20th*, 1928.

Four-Phase Transmission.

For the same maximum voltage above earth, which is the basis of comparison, there is practically no difference in the total amount of conductor material for the three-phase, the single-phase, and the "four-phase" (?) system.

Would we change the *phase* relations of a "T" system by connecting the vertical leg to the middle of the horizontal leg, saying one side of the latter is one phase and the other side another phase? There are two 2-phase relations, but the system remains 2-phase. In like manner, the system referred to as "four-phase" gives four 2-*phase* relations by pushing up the vertical leg and connecting at another point of it.

Among the principal requirements of any power transmission system is relative security of supply. The best system offering this, with or without a double circuit, is the three-phase system.

Many different comparisons can be given. Is it not more than unjust to base power-system comparisons on some one thing that is independent of the system itself?

William T. Taylor.

London, *February 25th*, 1928.

Switchgear Practice.

Could any of your readers who are switchgear experts state a case in justification of the practice illustrated by the two following examples?

(1) To control a 500-volt, 1,000-ampere, d.c., 2-wire circuit the gear comprised a single-pole breaker in one pole, and a single-pole knife switch in the other, but there were no isolating links.

(2) For a circuit of similar rating (500 V, 1,000 amps.) for a three-phase system, the gear comprised a three-pole breaker and three isolating links.

To be logical, it seems that the latter circuit should be provided with a two-pole breaker and a single-pole knife switch, assuming, of course, unearthed systems in both cases. I should be glad to hear the opinions of your readers.

Student.

London, *February 25th*, 1928.

Accumulator Tests.

The ELECTRICAL REVIEW, in a footnote to a letter under the above heading in the issue of February 17th, has once again pointed out that a certain "new" method of testing storage batteries, which has already been given a good deal of publicity, is not a practical test, in that it does not give any idea of efficiency under service conditions.

In discussing this matter, one cannot altogether rid one's mind of the fact that certain results obtained by the resurrection of this method have been used for advertising purposes; that these results are claimed to be unbeatable by other manufacturers; and that they constitute "a World's Record."

I fail to see any justification for the general adoption of this method of testing—even when used as an advertising medium, its publicity value is the reverse of useful to those who employ it.

The old-established battery manufacturers, even if they are still so archaic as to keep a copy of Wade on their shelves, will not "suffer cold shivers up the spine" by reason of the excellent article on modern storage batteries in a recent issue; and they are still less likely to do so because of impracticable claims.

J. W. A. Mann.

Sheffield, *February 21st*, 1928.

There is a big difference between electric storage batteries used in stationary, vehicle, and portable motive power service. In the field of the portable battery efficiencies are quite different to "effective performance." Efficiency—even though it complies with Wade's specification—is of trivial consequence compared with effectiveness of performance, the paramount consideration of most successful battery manufacturers. A very useful chart was devised by Mr. Carl Hering for the guidance of battery manufacturers, which sets out to resolve a "commercial efficiency" or "effective performance" curve.

Mr. Hering suggests a series of full charges and discharges for each test, and at each cycle of discharge the e.m.f. should fall—in each case—a certain fixed percentage of what it stood a few minutes after the beginning of the discharge at constant-current. The result is different for different makes, classes, and applications. This test will reveal that there are no two cells alike; the results will be different for different makes of cells.

I hope the Tungstone Company will accept the fact that it is "effective performance" and not "electrical efficiency" that plays the important part in the commercial life of the electric storage battery—hence the success of other battery manufacturers, irrespective of the axioms of "past generations."

George Humphry.

Wimbledon.

[This letter has been abbreviated.—EDS. ELEC. REV.]

"Disgusted Wireman" has omitted to communicate his name and address. Other letters are unavoidably held over.—EDS. ELEC. REV.

Published Specifications.

Compiled expressly for this journal by a firm of Chartered Patent Agents. The numbers in parentheses are those under which the specification will be printed and abridged, and all subsequent proceedings will be taken.

1926.

21,761. "Telegraphic receiving apparatus." Creed & Co., Ltd., and R. D. Salmon. September 3rd, 1926. (284,740.)

27,012. "Electric lamps emitting ultra-violet radiation." J. Robinson. October 28th, 1926. (284,746.)

27,315. "Electric machines and apparatus." English Electric Co., Ltd., and F. A. Youngmark. November 1st, 1926. (Cognate application 19,273/27.) (284,751.)

27,358. "Railway traffic controlling apparatus." Westinghouse Brake and Saxby Signal Co., Ltd. June 3rd, 1926. (272,161.)

27,359. "Railway traffic-controlling apparatus." Westinghouse Brake and Saxby Signal Co., Ltd. June 30th, 1926. (273,643.)

27,360. "Railway signalling apparatus." Westinghouse Brake & Saxby Signal Co., Ltd. May 18th, 1926. (Addition to 228,171.) (271,398.)

27,363. "Telephone Systems." Automatic Telephone Manufacturing Co., Ltd., W. O. Passmore, and A. E. Flenley. November 1st, 1926. (284,756.)

27,493. "Electric fuse holders." British Thomson-Houston Co., Ltd., A. G. Salisbury, and T. H. Woodfield. November 2nd, 1926. (284,760.)

27,496. "Piezo-electric devices." Standard Telephones & Cables, Ltd. (Western Electric Co., Inc.). November 2nd, 1926. (284,761.)

27,573. "Plunger-type electrical keys." Siemens Bros. & Co., Ltd., and F. Baker. November 3rd, 1926 (284,763.)

27,575. "Number dials for automatic and semi-automatic telephone systems and the like." Siemens Bros. & Co., Ltd., and E. R. Garrod. November 3rd, 1926. (Addition to 178,936.) (284,764.)

27,576. "Automatic and semi-automatic telephone systems." Siemens Bros. and Co., Ltd., and W. G. Patterson. November 3rd, 1926. (Cognate application 6,602/27.) (284,765.)

27,619. "Variable electrical resistances." J. L. Baird and Television, Ltd. November 3rd, 1926. (284,770.)

27,624. "Electrical protective arrangements for alternating current systems." W. J. Brown, A. B. Field, and Metropolitan-Vickers Electrical Co., Ltd. November 3rd, 1926. (284,771.)

27,625. "Metal-clad switchgear." D. R. Davies and Metropolitan-Vickers Electrical Co., Ltd. November 3rd, 1926. (284,772.)

27,626. "Electrical protective arrangements for alternating-current systems." W. J. Brown, A. B. Field, and Metropolitan-Vickers Electrical Co., Ltd. November 3rd, 1926. (284,773.)

27,627. "Fluid cooled conductors for alternating electric currents." N. R. Davis, C. R. Burch, and Metropolitan-Vickers Electrical Co., Ltd. November 3rd, 1926. (284,774.)

27,869. "Apparatus for regulating electric current intensity proportionally to the velocity of a revolving element." Messgerate Boykow Ges. November 7th, 1925 (261,627.)

27,922. "Electric protective systems." A. Reyrolle & Co., Ltd., and T. R. Warren. November 6th, 1926. (284,787.)

27,933. "Alloys and their application to telegraphic and telephonic conductors." W. S. Smith, H. J. Garnett, and J. A. Holden November 6th, 1926. (Cognate application 32,016/26.) (284,789.)

28,512. "Sparking plugs for internal-combustion engines or motors." D. Bramhall. November 12th, 1926. (284,797.)

28,887. "Oil-immersed electric apparatus." International General Electric Co., Inc. November 26th, 1925. (262,091.)

29,145. "Electric switches." Siemens and General Electric Railway Signal Co., Ltd., F. Downes, and W. D. Rogers. November 18th, 1926. (284,803.)

29,845. "Electromagnetic movements for relays, signal repeaters, track indicators, and the like." Automatic Telephone Manufacturing Co., Ltd., and R. W. Tarrant. November 25th, 1926. (284,809.)

30,000. "Automatic telephone systems." Siemens Bros. & Co., Ltd., D. P. Long and C. L. Peters. November 26th, 1926. (284,811.)

30,699. "Electrical motor-controlling systems." J. Lithgoe and H. Tinsley. December 3rd, 1926. (284,816.)

30,871. "Electrically-operated switch, crossing-gate and like machines for railway and other purposes." British Power Railway Signal Co., Ltd., S. L. Glenn, and E. E. Pierce. December 6th, 1926. (284,817.)

30,891. "Process for the production of carbon electrodes." I. Szarvasy. December 6th, 1926. (284,818.)

31,426. "Galvanic cells." A. Heil. December 10th, 1925. (262,814.)

31,621. "Electric light socket." A. Horcasitas. December 13th, 1926. (284,825.)

31,968. "System for reception of electrical impulses for controlling the operation of a selector." A. Barnay. December 18th, 1925. (263,176.)

1927.

1,760. "Electric accumulators." C. N. Waters. January 20th, 1927. (284,853.)

3,145. "Automatic control system for electric motors." H. V. James. February 3rd, 1927. (284,860.)

3,482. "Electrical condensers." A. Preen. February 7th, 1927. (284,861.)

5,105. "Electric junction boxes and the like." G. H. Scholes, F. J. Pearce and G. H. Scholes & Co., Ltd. February 23rd, 1927. (284,870.)

6,116. "Electric discharge devices." British Thomson-Houston Co., Ltd. March 6th, 1926. (267,141.)

6,601. "Automatic and semi-automatic telephone systems." Siemens Bros. and Co., Ltd., W. G. Patterson and E. W. Didier Garnham. March 9th, 1927. (284,766.)

8,049. "Receiving set having preliminary tuned circuits for radio waves." J. A. Baertsoen. March 23rd, 1927. (Convention date not granted.) (284,887.)

8,863. "Composite units particularly adapted for use in tuning circuits of wireless and like systems." J. Joseph, W. E. Knorr, and Radio Instruments, Ltd. March 31st, 1927. (284,892.)

10,111. "Loud-speakers and telephone receivers." G. Schutzler. April 19th, 1926. (269,561.)

10,223. "Insulating means for high potential terminals, conductors, and the like." P. R. Courtsey and Dubilier Condenser Co., (1925), Ltd. April 13th, 1927. (284,897.)

11,640. "Process of electro-depositing chromium." W. S. Eaton. May 2nd, 1927. (284,900.)

11,797. "Thermal and magnetic protective or indicating devices for electric circuits." International General Electric Co., Inc. May 20th, 1926. (271,439.)

13,782. "Electric switch-operating mechanism." British Thomson-Houston Co., Ltd. May 28th, 1926. (271,872.)

14,628. "Systems of electric supply." British Thomson-Houston Co., Ltd. June 28th, 1926. (273,265.)

15,097. "Transmission of high-tension polyphase currents." F. Berg. June 7th, 1927. (284,918.)

17,744. "Speed reducing system for electric motors." Koefoed, Hauberg, Marstrand and Helweg Aktieselskabet Titan, and A. F. B. Iversen. July 2nd, 1927. (284,928.)

17,744. "Antennæ system for wireless telegraphy, telephony, or the like." H. R. Khan. July 4th, 1927. (284,929.)

18,263. Electromagnetic switches." G. Dumont. July 20th, 1926. (274,845.)

18,497. "Wireless receivers." P. G. Browne. July 12th, 1927. (284,933.)

19,022. "Gramophone movement comprising an electric motor and a spring motor." W. Rebikoff. July 18th, 1927. (284,937.)

19,877. "Protecting device for high-tension electrical apparatus." Siemens-Reiniger-Veifa Ges. für Medizinische Technik. August 2nd, 1926. (275,235.)

23,559. "Galvanic batteries." Oldham & Son, Ltd., and H. E. Clarke. November 3rd, 1926. (Divided application on 275,832.) (284,953.)

25,138. "Control apparatus for electrical apparatus, such as motors." C. T. Scarf, C. H. Last, S. Gowan, and Metropolitan-Vickers Electrical Co., Ltd. November 23rd, 1926. (Divided application on 29,655/26.) (284,566.)

25,368. "Electric water-heaters." A. Huwyler. September 26th, 1927. (284,961.)

25,772. "Radio receiving devices." Marconi's Wireless Telegraph Co., Ltd. October 20th, 1926. (279,808.)

26,049. "Radio receivers." L. Levy. October 22nd, 1926. (279,424.)

26,219. "Dynamo-electric machines." Metropolitan-Vickers Electrical Co., Ltd. April 12th, 1926. (Divided application on 260,206.) (278,392.)

26,290. "Supported portable spiral wireless aerial." W. Hyams. October 5th, 1927. (284,963.)

26,291. "Adjustable portable wireless aerial." W. Hyams. October 5th, 1927. (284,571.)

26,794. "Control of induction motors." British Thomson-Houston Co., Ltd. October 16th, 1926. (279,073.)

27,439. "Method of, and means for, starting synchronous motors." L. Mellersh-Jackson (Electric Machinery Manufacturing Co.). July 20th, 1926. (Divided application on 283,981.) (284,177.)

28,741. "Electric battery-charging systems." British Thomson-Houston Co., Ltd. November 1st, 1926. (279,887.)

31,384. "Hornless loud-speakers." F. Brinkman. June 24th, 1927. (284,971.)

32,709. "Telegraph systems and circuit arrangements therefor." W. S. Smith, N. W. McLachlan, and W. G. R. Jacob. September 21st, 1926. (Divided application on 283,985.) (284,189.)

Trade Mark Applications.

THE following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from February 22nd:—

Rungbox. No. 484,925. Class 6. Dynamos, &c.—Carrier Engineering Co., Ltd., 24, Buckingham Gate, S.W.1.

"Xiks." Igranic Radio Services (lettering and design). No. 486,835. Class 8. Inductance coills for use in connection with radio-telephony and telegraphy.—Igranic Electric Co., Ltd.

Tablavox. No. 487,431, and Umbatt, No. 487,432. Class 8. Philosophical and scientific instruments, radio-telephonic apparatus, &c.—M.P.A. Co., Ltd., 62, Conduit Street, W.1.

Pentone. No. 487,654. All goods in Class 8.—Mullard Radio Valve Co., Ltd.

New Work for Contractors.

Particulars of new works and building schemes for the use of electrical installation contractors in search of work and all interested in the sale of electrical and allied plant and other products.

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

BARNSLEY.—Additional 198 houses, for the T.C.; borough surveyor.

BATH.—Refuse destructor scheme (£1,600), for the T.C.; borough engineer.

BEXLEY.—Welfare centre, The Broadway; U.D.C. surveyor.

BIRSTALL.—Business stores, Co-operative Society, Ltd.; W. Thornton & Son, architects, 11, Bond Street, Dewsbury.

BISHOP AUCKLAND.—Extensions, maternity centre; Durham County Council.

BOURNEMOUTH.—Workshops and alterations, central fire station; borough engineer. Billiard saloon, Brassey Road; T. J. Rowley. Boiler house, Curzon Hall, Curzon Road; Primavesi & Mauleverer. Cinema, Westover Road; Provincial Cinematograph Co.

BRADFORD.—Electric lighting installation, Lidget Green school; city architect, Town Hall.

BRENTWOOD.—District education offices and treatment centre, Montpelier House; Essex county architect.

BRIDLINGTON.—Bank premises, Manor Street; J. R. Earnshaw, architect, Kingsgate, Bridlington.

BRIGHTON.—Extensions, Royal Sussex County Hospital; F. T. Cawthorne, architect, 170, North Street. Memorial hall, Ship Street; Holy Trinity Church Council.

BURSLEM.—Additions, Waterloo Works, Waterloo Road; T. & R. Boote, Ltd. Garage, workshops and offices, Leek New Road; Shenton Bros.

CHEADLE AND GATLEY.—Housing scheme (60), for the U.D.C.; surveyor.

CLITHEROE.—Alterations and additions to Council school at Sawley; Education Department, County Hall, Wakefield.

COVENTRY.—New City Hotel (£12,000); W. S. Hattrell, architect.

CRANFIELD.—School (£6,000); Hampshire Education Committee.

DRONFIELD.—New Norton Hotel (£7,000 to £8,000), for Tennant Bros., Ltd., Sheffield: C. B. Flockton, architect, Sheffield.

DUKINFIELD.—Housing scheme (32), for the T.C.; borough surveyor.

EASTLEIGH.—Mental hospital; Joint Committee, Southampton and Bournemouth Corporations.

EDINBURGH.—Memorial hall for Lochend; A. Lorne Campbell, architect, Edinburgh. Church, Lochend, for the United Free Presbytery; Rev. David Paterson, D.D.

FARNHAM ROYAL (Bucks.).—Factory, Edinburgh Avenue; W. H. L. Price (Slough Estates, Ltd.).

GLASGOW.—Church hall in Mosspark Boulevard, for Congregational Union of Scotland; the minister. Picture house at Great Western Boulevard; secretary, N.B. Theatres, Ltd., 216, Bath Street. 822 houses at Knightswood, for Corporation; architect, Housing Department.

GLOSSOP.—Reconstruction, isolation hospital; borough engineer.

GREENOCK.—Music hall, for Argyll Theatre Co., Ltd.; the secretary.

GRIMSBY.—34 houses, Nunthorpe; R. M. Phillips.

HAMILTON.—Re-housing scheme (80), for the T.C.; burgh surveyor. Hippodrome, Townhead Street, for E. H. Bostock & Sons, Ltd.

HAMPTON.—Extensions, launch works; Hampton Launch Works, Ltd.

HERTFORD.—Garage for 50 cars and showrooms, London Road, for A. E. Neale, motor engineer.

HEYWOOD (Lancs.).—Kinema and dance hall, for the Savoy Cinema Co. (Heywood), Ltd.; J. F. Emery, managing director, Theatre Royal, Manchester.

HUDDERSFIELD.—Greyhound racing track; Greyhound Racing and General Entertainments, Ltd.

HULL.—Houses (400), for the T.C.; H. M. Noell, builder, Stockton-on-Tees.

LAMBOURN.—School, for Berks. E.C.; H. J. C. Neobard, clerk, Reading.

LINCOLN.—Housing scheme (50), Moorland Park, for the T.C.; S. C. Baggott, city engineer.

LONDON (Islington, N.).—Dwellings, King's Cross estate (£69,000); L.C.C. architect.

(Hackney, E.).—Buildings, Paragon Road; H.M. Office of Works. Reconstruction, 92-100, Stoke Newington Road; Hobden & Potti. Hall, Wilton Road; W. H. Ansell.

(Walthamstow, E.).—Enlargement, County High School for Girls; Essex county architect.

(Deptford, S.E.).—Dwellings, Hughes Fields estate (£23,000); L.C.C. architect. Technical institute (£120,500), for the borough E.C.; clerk.

LONDON (*continued.*)

(Bermondsey, S.E.).—Warehouse, Stoney Lane; Stock, Page and Stock.

(Charlton Park, S.E.).—School, for the London E.C.; Director of Education.

(Forest Hill, S.E.).—Cinema, London Road (£60,000), for the Apollo Cinema Co., Ltd.

(Greenwich, S.E.).—Power wiring, lighting and telephones, Central Repair Depôt; L.C.C. Tramways Department.

(Lewisham, S.E.).—Extensions to central library (£9,698), for the T.C.; borough surveyor. Public-house, Moorside Road; Barclay, Perkins & Co., Ltd.

(New Cross, S.E.).—Baths, Laurie Grove, for Deptford T.C.; borough engineer.

(Balham, S.W.).—Extensions, 47-51, High Road; Royal Arsenal Co-operative Society, Ltd.

(Clapham, S.W.).—Extensions, South London Hospital for Women, South Side; William Downs, Ltd.

(Fulham, S.W.).—Buildings, North End Road; J. Bromley and Co.

(Mortlake, S.W.14).—Enlargement of Roman Catholic parochial hall; rector.

(Southfields, S.W.).—18 flats, Buckhold Road; E. Clarke and Sons.

MALTBY HALL.—Electric lighting at Council school; Education Department, County Hall, Wakefield.

MANCHESTER.—Housing scheme (100), for Didsbury Park Estate, Ltd., 23, King Street West, Manchester. School at Collyhurst; St. Malachy's Catholic trustees. Nurses' home, Crumpsall Infirmary, Crescent Road; A. J. Murgatroyd, architect, 23, Strutt Street. Elementary school, Cross Street and Queen Street; Education Committee.

MANSFIELD.—Church (£15,000); vicar of Rainworth.

MARCH.—Hippodrome; H. Bancroft, Wisbech Hippodrome.

MAXWELLTOWN.—Additional 52 houses, for the T.C.; J. M. Bowie, burgh surveyor.

MEIR.—Housing scheme on 50 acres; Stoke-on-Trent city engineer.

MELTON MOWBRAY.—School (£12,727), for Leicestershire E.C.; E. Newham, builder.

MORECAMBE.—Alterations, West View Terrace; National Provincial Bank, Ltd. Alterations, Bull Hotel; J. Smith. Additions, Morecambe Street; St. John Ambulance Association. Promenade improvement (£34,000); borough engineer. Refuse disposal works; Petrie and McNaught.

NESTON AND PARKGATE.—Housing scheme (50), for the Neston and District Council of Social Service; particulars from Larden Williams.

NETHER WALLOP.—School (£4,500); Hampshire Education Committee.

NEWPORT (I. of W.).—Improvements, lighting and ventilation, County Offices; Isle of Wight C.C.

NORTHAMPTON.—Additional 53 houses, for the T.C.; Alfred Fidler, borough engineer.

NORTHFLEET.—Offices, showrooms and workshops, High Street; Gordon Stanham. Laboratory, canteen, &c.; A.P.C.M., Ltd.

NORTHWOOD (Middlesex).—Completion of St. Matthew's Roman Catholic Church and presbytery, Hallowell Road (£3,000); rector.

PAIGNTON.—Stores, Manor Road; Paignton Development Co., Ltd.

PETERBOROUGH.—Installation of electric lighting and heating, Alms Rooms, for the United Charity Trustees; Joseph Stephenson, clerk, Queen Street Chambers.

PINNER.—Elementary school; W. S. Try, Cowley.

PLYMOUTH.—Rehousing, Castle Street and New Street areas; borough engineer.

PORT-GLASGOW.—New workshops and extensions of present buildings, for McGregor's Port-Glasgow Engineering Co., Ltd.; the manager. New Roman Catholic school, to cost £30,000; Roman Catholic Archbishop, Glasgow.

PRESTWICH.—300 houses, Polefield estate; U.D.C. surveyor.

RENFREWSHIRE.—222 houses at Barrhead, for Town Council (electric lighting); John Pattison, town clerk, Municipal Buildings, Barrhead.

ST. ANDREW'S.—Residence hall at University (£58,000); J. D. Mills, F.R.I.B.A., architect.

SKEGNESS.—Extensions, Marine Hotel (£7,000); W. B. Lambe.

STOKE-ON-TRENT.—Additions, warehouse, Queen Street; Haynes & Son.

SWANSEA.—Additions, General Hospital; governors. Institute, Mumbles Road; Mr. Hurn. Drill hall, Mumbles; A. Tucker. Institute, Landore; British Mannesmann Tube Co, Ltd.